ML 4000

ALLEN&HEATH

Dual Function Live Sound Console

USER GUIDE

Publication AP4314

Introduction

This user guide presents a quick reference to the **ML4000.** We recommend that you read this fully before starting. Included is information on installing, connecting and operating the console, panel drawings, system block diagram and technical specification. For further information on the basic principles of audio system engineering, please refer to one of the specialist publications available from bookshops and audio equipment dealers.

Whilst we believe the information in this guide to be reliable we do not assume responsibility for inaccuracies. We also reserve the right to make changes in the interest of further product development.

We are able to offer further product support through our world-wide network of approved dealers and service agents. You can also access our Web site on the Internet for information on our product range, assistance with your technical queries or simply to chat about matters audio. To help us provide the most efficient service please keep a record of your console serial number, and date and place of purchase to be quoted in any communication regarding this product. The serial number is located on the rear panel.

Check out our home site for information on the company and its pedigree, our full product range and our design philosophy. We also have a site dedicated to the exciting **ML Series** consoles.

www.allen-heath.com

www.mlseries.com

ML4000 User Guide AP4314 Issue 4

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ALLEN&HEATH

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Limited One Year Warranty

This product has been manufactured in the UK by ALLEN & HEATH and is warranted to be free from defects in materials or workmanship for period of one year from the date of purchase by the original owner.

To ensure a high level of performance and reliability for which this equipment has been designed and manufactured, read this User Guide before operating.

In the event of a failure, notify and return the defective unit to ALLEN & HEATH or its authorised agent as soon as possible for repair under warranty subject to the following conditions :

Conditions Of Warranty

1. The equipment has been installed and operated in accordance with the instructions in this User Guide
2. The equipment has not been subject to misuse either intended or accidental, neglect, or alteration other than as described in the User Guide or Service Manual, or approved by ALLEN & HEATH.
3. Any necessary adjustment, alteration or repair has been carried out by ALLEN & HEATH or its authorised agent.
4. The defective unit is to be returned carriage prepaid to ALLEN & HEATH or its authorised agent with proof of purchase.
5. Units returned should be packed to avoid transit damage.

In certain territories the terms may vary. Check with your ALLEN & HEATH agent for any additional warranty which may apply.

CE This product complies with the European Electromagnetic Compatibility directives 89/336/EEC & 92/31/EEC and the European Low Voltage Directives 73/23/EEC & 93/68/EEC.

This product has been tested to EN55103 Parts 1 & 2 1996 for use in Environments E1, E2, E3, and E4 to demonstrate compliance with the protection requirements in the European EMC directive 89/336/EEC. During some tests the specified performance figures of the product were affected. This is considered permissible and the product has been passed as acceptable for its intended use.

Allen & Heath has a strict policy of ensuring all products are tested to the latest safety and EMC standards. Customers requiring more information about EMC and safety issues can contact Allen & Heath.

NOTE: Any changes or modifications to the console not approved by Allen & Heath could void the compliance of the console and therefore the users authority to operate it.

Important Safety Instructions

WARNINGS - Read the following before proceeding :

ATTENTION: RISQUE DE CHOC ELECTRIQUE – NE PAS OUVRIR

Read instructions: Retain these safety and operating instructions for future reference. Adhere to all warnings printed here and on the console power unit. Follow the operating instructions printed in this user guide and the power unit user guide.

Do not remove covers: Operate the power unit with its covers correctly fitted. Refer any service work to competent technical personnel only.

Power sources: Connect the power unit to a mains power only of the type described in this User Guide and marked on the rear panel. Use the power cord with sealed mains plug appropriate for your local mains supply as provided with the console. If the provided plug does not fit into your outlet consult your service agent for assistance.

Power cord routing: Route the power cord so that it is not likely to be walked on, stretched or pinched by items placed upon or against it.

Grounding: Do not defeat the grounding and polarisation means of the power cord plug. Do not remove or tamper with the ground connection in the power cord.

WARNING: This equipment must be earthed.

Water and moisture: To reduce the risk of fire or electric shock do not expose the power unit or console to rain or moisture or use it in damp or wet conditions. Do not place containers of liquids on it which might spill into any openings.

Ventilation: Do not obstruct the ventilation slots or position the console or power unit where the air flow required for ventilation is impeded. If the console is to be operated in a flightcase ensure that it is constructed to allow adequate ventilation.

Heat and vibration: Do not locate the power unit in a place subject to excessive heat or direct sunlight as this could be a fire hazard. Locate the console and its power unit away from any equipment which produces heat or causes excessive vibration.

Servicing: Switch off the equipment and unplug the power cord immediately if it is exposed to moisture, spilled liquid, objects fallen into the openings, the power cord or plug become damaged, during lightening storms, or if smoke, odour or noise is noticed. Refer servicing to qualified technical personnel only.

Installation: Install the console in accordance with the instructions printed in this User Guide. Do not connect the output of power amplifiers directly to the console. Use audio connectors and plugs only for their intended purpose.

Important Mains Plug Wiring Instructions.

The power unit is supplied with a moulded mains plug fitted to the AC mains power lead. Follow the instructions below if the mains plug has to be replaced.

The mains lead wires are coloured in accordance with the following code:

TERMINAL		WIRE COLOUR	
		European	USA/Canada
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN & YELLOW	GREEN

The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked with the letter E or with the Earth symbol. **This appliance must be earthed.**

The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N.

The wire which is coloured Brown must be connected to the terminal in the plug which is marked with the letter L.

Ensure that these colour codes are followed carefully in the event of the plug being changed.

General Precautions

Damage : To prevent damage to the controls and cosmetics avoid placing heavy objects on the control surface, scratching the surface with sharp objects, or subjecting the console to rough handling and vibration.

Environment : Protect from excessive dirt, dust, heat and vibration when operating and storing. Avoid tobacco ash, smoke, drinks spillage, and exposure to rain and moisture. If the console becomes wet, switch off and remove mains power immediately. Allow to dry out thoroughly before using again.

Radiation : To avoid induced noise and interference pickup do not operate the console close to strong sources of electromagnetic radiation such as power supplies, video monitors, lighting cables and dimmers.

Cleaning : Avoid the use of chemicals, abrasives or solvents. The control panel is best cleaned with a soft brush and dry lint-free cloth. Stubborn marks can be removed using a cloth dampened with isopropyl alcohol. Do not leave marking tape stuck to the console for long periods of time as the adhesive can degrade and leave a sticky residue. The faders, switches and potentiometers are lubricated for life. The use of electrical lubricants on these parts is not recommended. Refer to the power unit user guide for instructions on cleaning its ventilation filters.

Transporting : The console should be transported in the original packing or purpose built foam lined flightcase. Protect the control surface from damage during transit. The console is a large and heavy item. To avoid injury ensure adequate man power and precaution when lifting or moving the console.

ML4000 Key Features

The Allen & Heath **ML4000** is a large format VCA equipped dual function live sound console providing many of the features of its larger brother the **ML5000**. It can be quickly configured for front-of-house (FOH) or stage monitor mixing. As one console suitable for both applications it is equally well suited to installation, rental and touring. It offers an IO capability and feature set that satisfies the latest trends in live sound engineering, in particular the growing number of inputs and outputs for multi-speaker house and monitor systems, demands of stereo in-ear monitoring, 3 speaker LCR imaging, advanced grouping and automation. The design ensures on-the-road durability, a clear layout for easy walk up and go operation, and no-compromise audio performance.

Inputs and Outputs

- 4 Standard frame sizes: 24+2, 32+2, 40+2, 48+2 (mono + dual stereo channels)
- Optional 'B' versions: 20+6, 28+6, 36+6, 44+6 (mono + dual stereo channels)
- 24, 32, 40, 48 mono mic/line inputs with inserts and direct outputs
- 2 dual stereo line inputs standard (6 optional)
- 24 input sidecar to expand to a maximum 96 inputs
- Main Left, Right and Centre outputs with inserts, Centre configurable as the engineers monitor
- 8 Groups, 12 Auxes: Group/Aux 1-8 and Aux 9-12 with faders and inserts, Aux 1-8 with rotaries
- 11x4 Matrix
- 2-Track monitor input and recording send
- Stereo headphones and local monitors
- Talkback mic input
- ClearCom compatible intercom interface

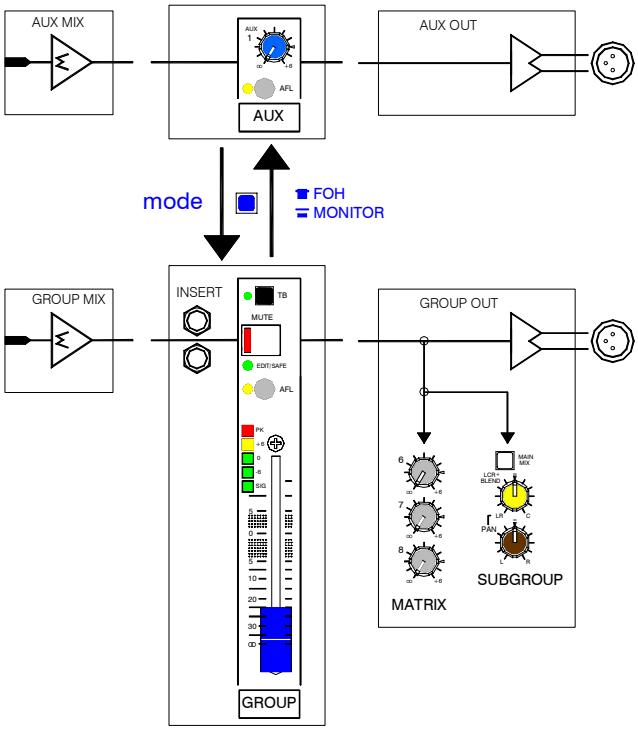
Groups and Automation

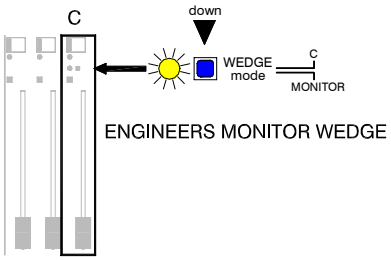
- 8 VCA groups with mutes and PAFL monitoring
- 8 audio groups with LCRplus™ sub grouping
- 8 mute groups
- MIDI accessible snapshot memories
- MIDI mute on/off, snapshot recall and dump in/out control
- Channels can be made safe from the automation

Processing and Control

- 4-Band full sweep mono EQ with switched Q mids, 4-band fixed frequency stereo EQ
- Sweepable high pass filter
- LCRplus™ 3 speaker imaging system
- Protected mode switching to configure the console for FOH or monitor application
- Intelligent PAFL system with all-clear, PFL/in-place AFL, priority, auto-cancel/add mode…
- Assignable talkback and intercom
- 1kHz tone and pink noise generator for system line-up and testing
- Full console monitoring and extensive metering of inputs, mix busses and outputs

Copy this sheet to keep with the console for guest user reference.





Configure the Mode Switches :

Use a pen or pointed object to select the underpanel mode switches.

FRONT-OF-HOUSE

AUX 1-8 = AUX 1-4 and 5-8 switchable pre or post-fade. Rotary masters.

AUX 9-12 = Switchable pre or post-fade and mono or stereo in pairs. Fader masters with inserts.

GROUP 1-8 = Audio groups with paired routing switches. Fader masters with subgrouping and matrix sends.

MONITOR

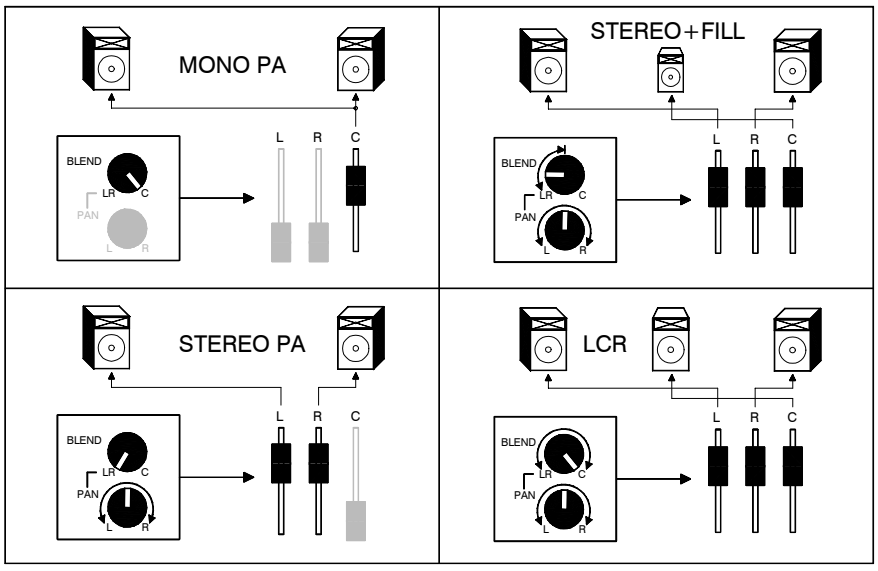
AUX 1-8 = Monitor mix 1-4 and 5-8 switchable pre or post-fade. Fader masters with inserts. Group mix on rotary masters.

AUX 9-12 = Monitor mix 9-12 switchable pre or post-fade and mono or stereo in pairs. Fader masters with inserts.

MAIN C OUT = Engineers wedge monitor.

DUAL MODE

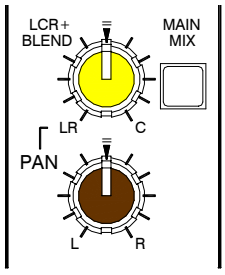
Set the mode switches to configure fader masters 1-8 in any combination of audio groups and aux sends.

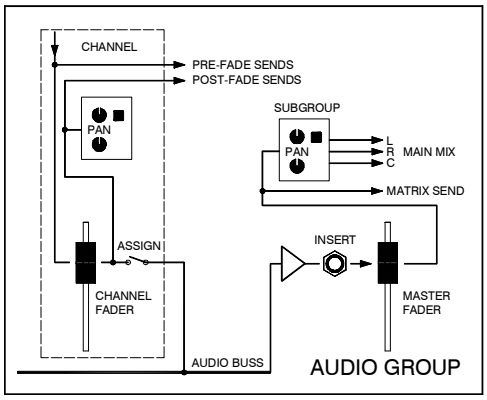


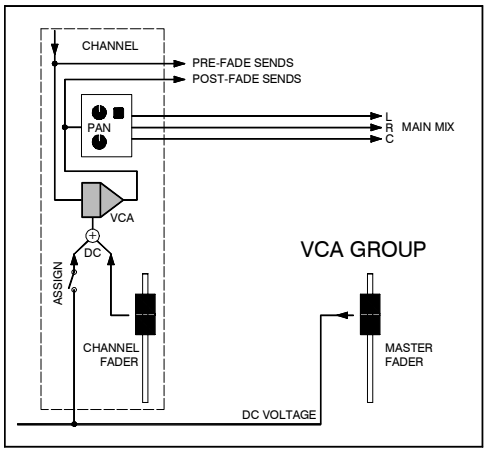
Using LCRplus™

PAN and BLEND = Two controls adjust the balance between L, R and C.

MAIN MIX = Routes the channel to the main L,R,C outputs.

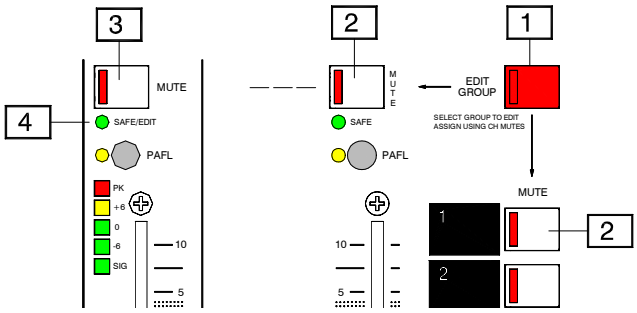


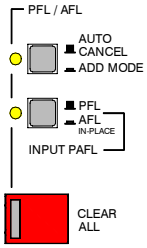




How to Assign a VCA or MUTE GROUP :

1. Press EDIT GROUP. The key flashes.
2. Press MUTE on the master you want to edit. It flashes.
3. Press the channel MUTE keys to assign or remove them from the group.
4. Check which channels are assigned on the channel SAFE/EDIT LEDs.
5. Press the next master to edit. Press EDIT GROUP when finished to return to exit edit mode.





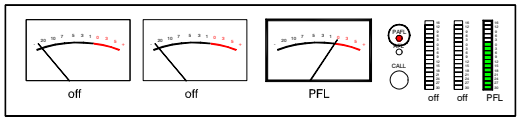
Using P/AFL :

Input PAFL = Select mono PFL or stereo in-place AFL.

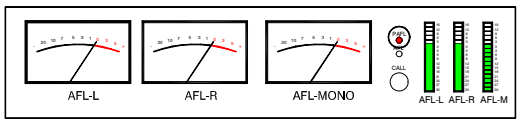
Output AFL = Press one for mono, two together for stereo.

Input PAFL overrides output AFL. Output AFL cancels input PAFL.

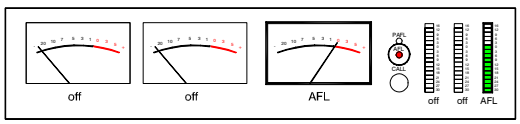
INPUT PAFL = mono PFL — Mono PFL on C meter. L and R meters turn off.



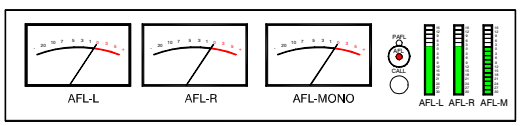
INPUT PAFL = stereo AFL — Stereo on L,R meters, mono sum on C meter



OUTPUT AFL = mono — Mono AFL on C meter. L and R meters turn off.



OUTPUT AFL = stereo — Stereo on L,R meters, mono sum on C meter



Problems ?

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The channel is routed but there is no audio. If it is assigned to a VCA group check that the group fader is up.

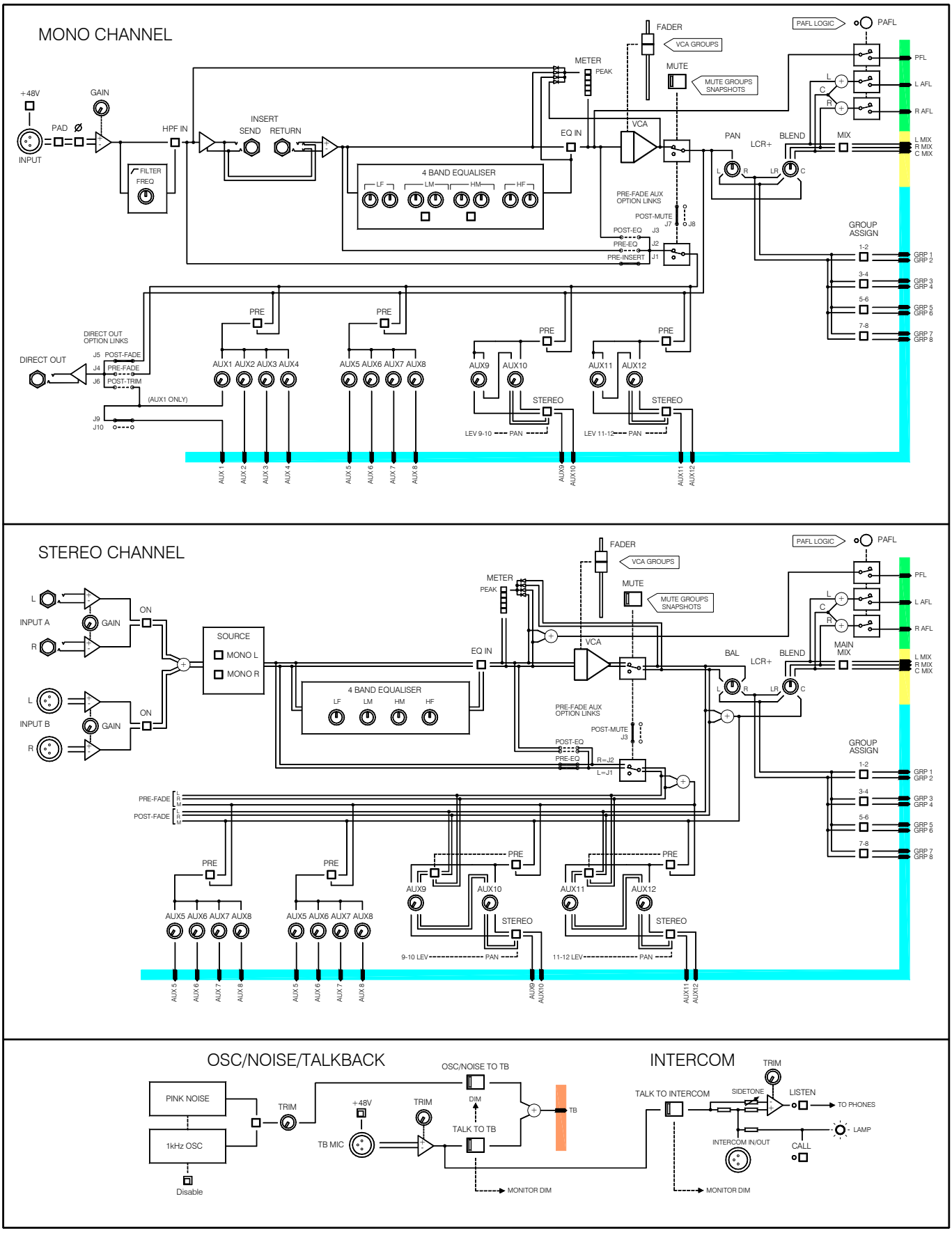
The audio groups do not work. Check the setting of the fader master 1-8 GRP/AUX mode switches.

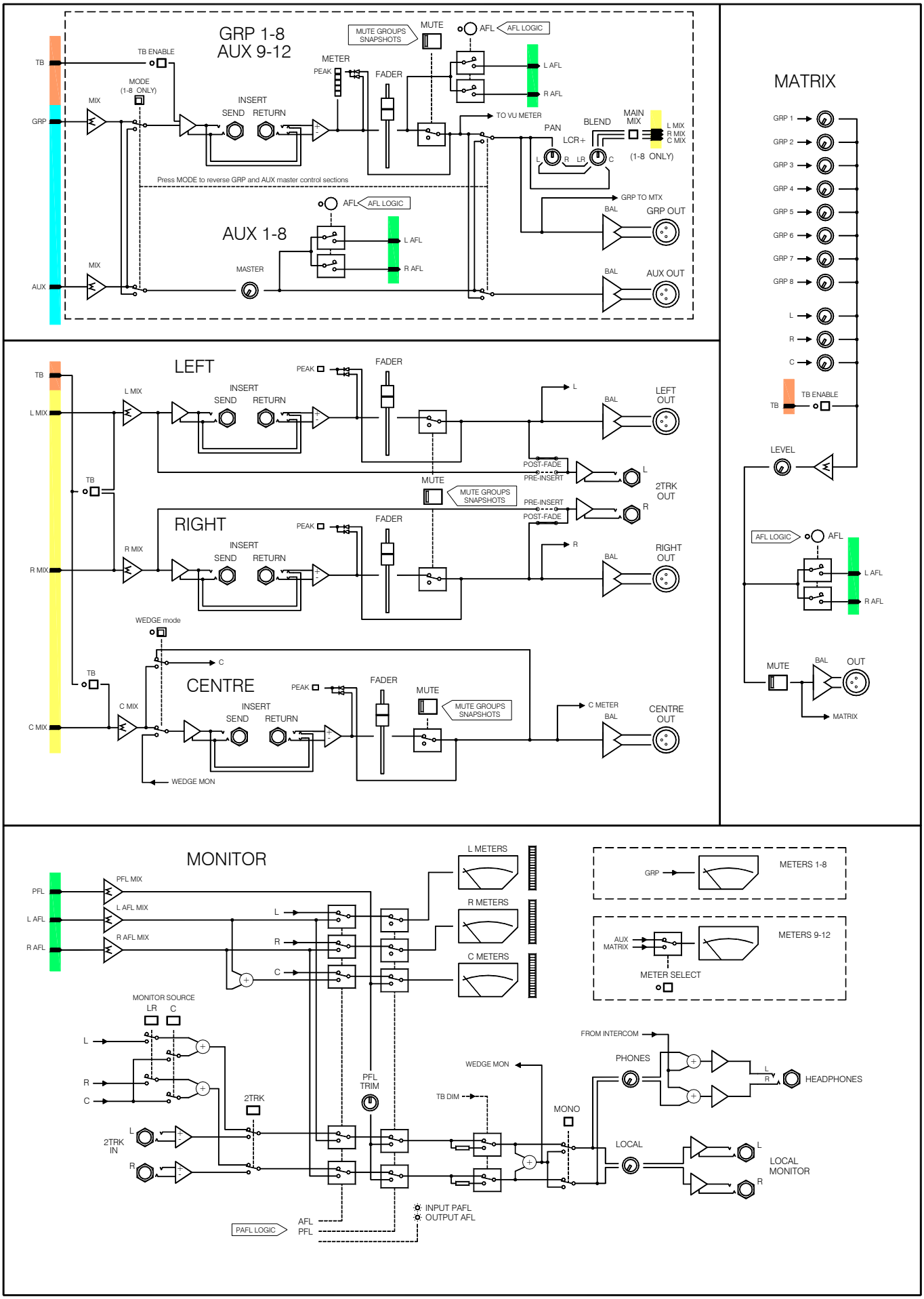
The PAN control does not work. For main mix check the setting of the BLEND control. For groups check the GRP PAN ON switch.

The console takes a long time to power up. Check the rear panel slide switch setting. RS232 takes longer to boot in than MIDI.

The channel does not respond to MIDI. Check that it has not been made safe (green SAFE/EDIT LED on in normal console mode).

SYSTEM BLOCK DIAGRAM




GRP 1-8
AUX 9-12
MUTE GROUPS SNAPSHOTS
MUTE
AFL
AFL LOGIC
TB
TB ENABLE
METER
PEAK
FADER
MODE (1-8 ONLY)
MIX
GRP
INSERT
SEND
RETURN
L AFL
R AFL
TO VU METER
PAN
BLEND
MAIN MIX
L MIX
R MIX
C MIX
LCR+
L
R
LR
C
(1-8 ONLY)
Press MODE to reverse GRP and AUX master control sections
GRP TO MTX
BAL
GRP OUT
AUX 1-8
AUX
MASTER
AUX OUT
MATRIX
GRP 1
GRP 2
GRP 3
GRP 4
GRP 5
GRP 6
GRP 7
GRP 8
LEVEL
LEFT
L MIX
POST-FADE
PRE-INSERT
2TRK OUT
LEFT OUT
RIGHT
R MIX
RIGHT OUT
WEDGE mode
CENTRE
C MIX
C METER
CENTRE OUT
WEDGE MON
MONITOR
PFL
L AFL
R AFL
PFL MIX
L AFL MIX
R AFL MIX
L METERS
R METERS
C METERS
METERS 1-8
METERS 9-12
AUX MATRIX
METER SELECT
MONITOR SOURCE
LR
C
2TRK
2TRK IN
PFL TRIM
TB DIM
MONO
FROM INTERCOM
PHONES
HEADPHONES
LOCAL
LOCAL MONITOR
PAFL LOGIC
INPUT PAFL
OUTPUT AFL

Technical Specifications

0dBu = 0.775 Vrms, +4dBu = 1.23 Vrms

Operating Levels
Channels ..... 0dBu Headroom +21dB
Mix ..... -2dBu Headroom +23dB
Max XLR output ..... +23dBu

Frequency Response Referred to 1kHz at +4dBu
Mic to main output (+40dB)..... 20Hz to 30kHz +0/-0.5dB
Line to main output (0dB)..... 20Hz to 30kHz +0/-0.5dB

Distortion @1kHz +14dBu
THD+noise ..... < 0.02%

CMRR Common mode rejection @1kHz
Mic (+40dB)..... > 80dB
Mic + Pad (0dB) ..... > 50dB

Crosstalk Referred to driven channel @1kHz
Channel to channel ..... < -95dB
Mute shutoff ..... < -90dB
Fader shutoff ..... < -90dB

Noise Performance Measured rms 22Hz to 22kHz unweighted
Mic EIN with 150 ohm source ..... -128dB
Residual output noise ..... < -98dBu
Mix noise, nothing routed ..... < -94dBu
Mix noise, 24 channels routed ..... < -84dBu

Metering
Reading 0..... 0dBu at XLR outputs
LED meters ..... Peak reading, 3 colours
VU meters ..... Ave reading, Illuminated moving coil
Peak indicators ..... 5dB before clip, multi-point sensing
Input meters ..... 5 bar LED (signal, -6, 0, +6, peak)
Group mix meters .... 5 bar LED (signal, -6, 0, +6, peak)
Group/Mtx meters .... VU
L,R,C meters ..... VU and 16 bar LED

Lamp Connectors x3
Connector ..... XLR-F 4pin
Rating..... 12V 400mA max

Channel Filters
Slope ..... 12dB/oct high pass
Frequency ..... 20Hz to 400Hz

Mono Equaliser
HF..... +/-15dB, 2kHz to 20kHz shelf
HM..... +/-15dB, 500Hz to 15kHz bell, Q = 1 or 2
LM ..... +/-15dB, 35Hz to 1kHz bell, Q = 1 or 2
LF ..... +/-15dB, 20Hz to 200Hz shelf

Stereo Equaliser
HF..... +/-15dB, 12kHz shelf
HM..... +/-15dB, 2.5kHz bell
LM ..... +/-15dB, 250Hz bell
LF ..... +/-15dB, 60Hz shelf

Power Supply Model MPS14
Type ..... External 2U rack or floor mount
Mains input..... 100-230V 50/60Hz universal input
Power consumption.... 500W
Full protection and fan cooling
Built-in combiner for redundant supply

Dimensions	Width.....	Depth	.....Height
24 Channel	1196 (47”)	781 (30.7”)	282 (11.1”)
32 Channel	1451 (57”)	781.....	282
40 Channel	1706 (67”)	781.....	282
48 Channel	1961 (77”)	781.....	282
Sidecar	831 (33”)	781.....	282
MPS14 psu	483 (19”)	260 (10.2”)....	

Weights
24 Channel..... 53 kg (116 lbs)
32 Channel..... 65 kg (143 lbs)
40 Channel..... 75 kg (165 lbs)
48 Channel..... 87 kg (191 lbs)
24 Sidecar..... 40 kg (88 lbs)
MPS14 psu .... 2.5 kg (5 lbs)

INPUTS:

Mic (Pad out).....	XLR.....	balanced, pin2+.....	2k ohm	variable -60 to -10dBu	Max +11dBu
Mic (Pad in).....	.....	.....	>20k ohm	variable -40 to +10dBu	Max +31dBu
Stereo A	TRS jack.....	balanced, tip+.....	>20k ohm	variable -18 to +6dBu	Max +27dBu
Stereo B	XLR.....	balanced, pin2+.....	>20k ohm	variable –18 to +6dBu	Max +27dBu
2-Track.....	TRS jack.....	balanced, tip+	>20k ohm	+4dBu	Max +25dBu

INSERTS:

Input send	TRS jack.....	ground comp, tip+	<50 ohm.....	0dBu	Max +21dBu
Input return.....	TRS jack.....	balanced, tip+.....	>20k ohm.....	0dBu	Max +21dBu
Output send	TRS jack.....	ground comp, tip+	<50 ohm.....	-2dBu.....	Max +21dBu
Output return.....	TRS jack.....	balanced, tip+.....	>20k ohm.....	-2dBu.....	Max +21dBu

OUTPUTS:

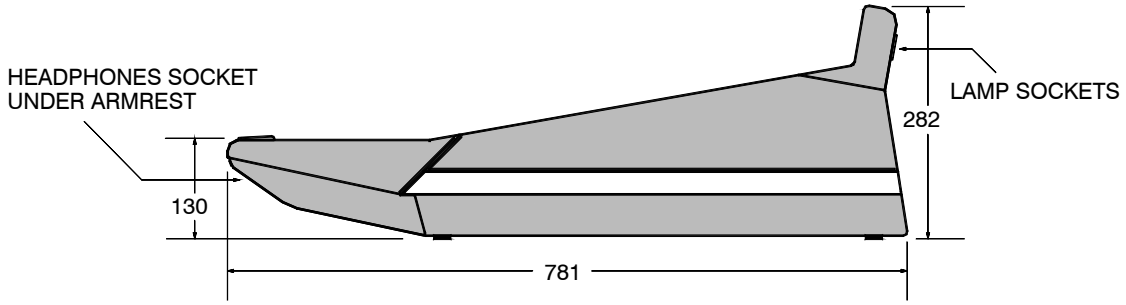
L,R,C.....	XLR.....	balanced, pin2+.....	<75 ohm.....	0Bu	Max +23dBu
Grp/Aux 1-12.....	XLR.....	balanced, pin2+.....	<75 ohm.....	0dBu	Max +23dBu
Matrix 1-4	XLR.....	balanced, pin2+.....	<75 ohm.....	0dBu	Max +23dBu
Direct out.....	TRS jack.....	ground comp, tip+	<50 ohm.....	0dBu	Max +21dBu
2-Track.....	TRS jack.....	ground comp, tip+	<50 ohm.....	0dBu	Max +21dBu
Local Monitor	TRS jack.....	ground comp, tip+	<50 ohm.....	0dBu	Max +21dBu
Headphones.....	TRS jack.....	tip left, ring right.....	for stereo headphones >30 ohms		

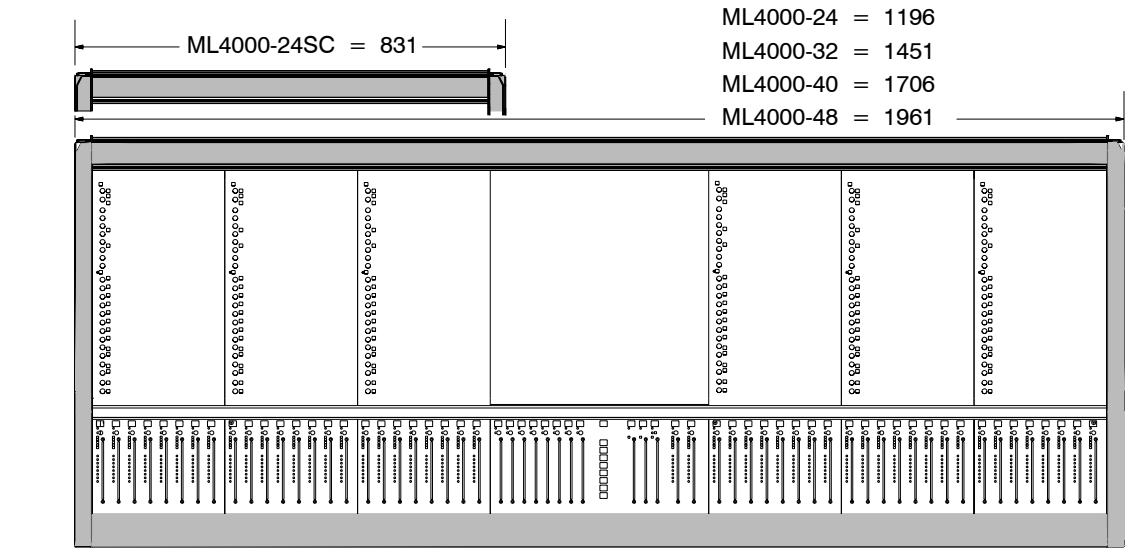
The Range

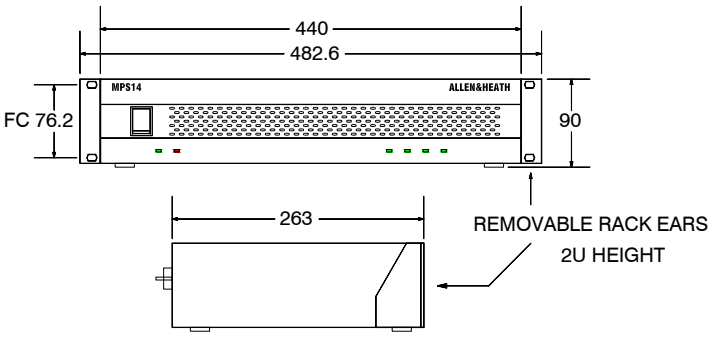
- ML4000-24 24 mono, 2 dual stereo inputs
- ML4000-32 32 mono, 2 dual stereo inputs
- ML4000-40 40 mono, 2 dual stereo inputs
- ML4000-48 48 mono, 2 dual stereo inputs
- ML4000-24B 20 mono, 6 dual stereo inputs
- ML4000-32B 28 mono, 6 dual stereo inputs
- ML4000-40B 36 mono, 6 dual stereo inputs
- ML4000-48B 44 mono, 6 dual stereo inputs
- ML4000-24SC 24 mono input sidecar
- MPS14 2U power supply unit
- 002-583 2.8 metre DC power lead
- 002-584 0.5 metre DC combiner lead
- AP4314 ML4000 Console User Guide
- AP4373 ML4000 Sidecar User Guide
- AP3898 MPS14 User Guide
- AP4316 ML4000 Service Manual
- AL4061 Gooseneck lamp 18”

Installation Details

Weights		
	24 Channel	53 kg (116 lbs)
	32 Channel	65 kg (143 lbs)
	40 Channel	75 kg (165 lbs)
	48 Channel	87 kg (191 lbs)
	24 Channel sidecar	40 kg (88 lbs)
	MPS14 psu	2.5 kg (5 lbs)



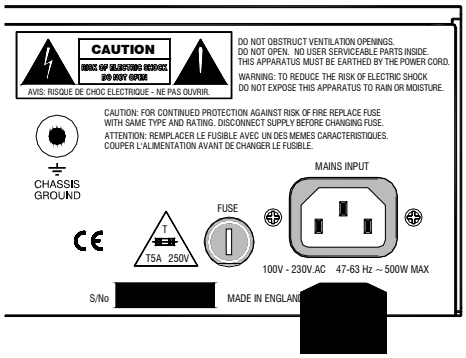


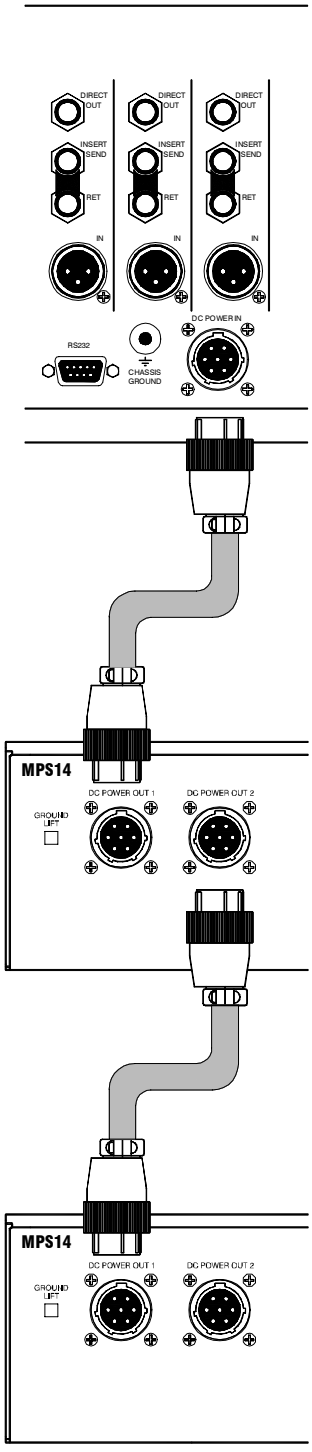


Refer to the power supply user guide for safety and installation instructions. **Heed all warnings printed in the user guide and on the power unit**.

Refer to the sidecar user guide for instructions on connecting the sidecar expander to the console.

Connecting the Power Supply


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
AVIS: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR.
DO NOT OBSTRUCT VENTILATION OPENINGS.
DO NOT OPEN. NO USER SERVICEABLE PARTS INSIDE.
THIS APPARATUS MUST BE EARTHED BY THE POWER CORD.
WARNING: TO REDUCE THE RISK OF ELECTRIC SHOCK
DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE REPLACE FUSE
WITH SAME TYPE AND RATING. DISCONNECT SUPPLY BEFORE CHANGING FUSE.
ATTENTION: REMPLACER LE FUSIBLE AVEC UN DES MEMES CARACTERISTIQUES.
COUPER L'ALIMENTATION AVANT DE CHANGER LE FUSIBLE.
CHASSIS GROUND
MAINS INPUT
FUSE
T5A 250V
100V - 230V.AC 47-63 Hz ~ 500W MAX
S/No
MADE IN ENGLAND



The **ML4000** console range is supplied with the **MPS14** power supply unit. A second **MPS14** may be connected through the first as a redundant (backup) supply.

Before connecting please read the **IMPORTANT SAFETY INSTRUCTIONS** printed at the front of this user guide and the warnings printed on the rear of the power supply. Also read the user guide provided with the power supply. Heed all instructions regarding the installation and ventilation requirements of the unit.

Connecting Mains Power

Check that the correct mains lead with moulded plug suitable for your territory has been supplied with your console. The **MPS14** accepts mains voltages within the range 100-240V AC without the need to change any fuses or settings.

Make sure that the IEC mains plug is pressed fully into the MAINS INPUT socket.

Connecting the DC Cable

Plug the cable into the power supply DC POWER OUT 1 socket. First align the locating lugs, press the plug into the socket, and screw on the locking ring to hold it firmly in place. Plug and secure the other end into the console DC POWER IN socket.

If you are using a second 'redundant' supply as a backup then connect the short cable to both power supplies. Connect from the DC POWER OUT 1 socket on the backup supply to DC POWER OUT 2 on the main supply.

Turning the Console On or Off

First check that the mains and DC leads are correctly plugged in and secured. Turn on the power supply using its front panel mains switch. The console must be connected to the power supply before turning it on. Failure to do so will result in the unit powering up in protect mode. Turn off, connect the console, and turn on again.

To avoid loud pops in the speakers make sure that the connected power amplifiers are turned off before switching the console on or off.

⚠ WARNING: To avoid damage to the speakers always switch the power amplifiers on last and off first.

Earthing

The connection to earth (ground) in an audio system is important for two reasons:

1. **SAFETY** - To protect the operator from high voltage shock, and

2. **AUDIO PERFORMANCE** - To minimise the effect of earth (ground) loops which result in audible hum and buzz, and to shield the audio signals from interference.

For safety it is important that all equipment earths are connected to mains earth so that exposed metal parts are prevented from carrying high voltage which can injure or even kill the operator. It is recommended that the engineer check the continuity of the safety earth from all points in the system including microphone bodies, guitar strings, connector cases, equipment panels and so on.

The same earth is also used to shield audio cables from external interference such as the hum fields associated with power transformers, lighting dimmer buzz, and computer radiation. Problems arise when the signal sees more than one path to mains earth. An earth loop results causing current to flow between the different earth paths. This condition is usually detected as a mains frequency audible hum or buzz.

To ensure safe and trouble-free operation we recommend the following:

Use a clean mains outlet for the audio system. Keep the audio equipment mains feed separate from that powering 'dirty' equipment such as air conditioning and lighting systems, motors and vending machines.

Use star point earthing. It is best to install a 'star point' system where the individual earths to the equipment racks and equipment areas are separately run from a solid central reference earth point.

Have your mains system checked by a qualified electrician. If the supply earthing is solid to start with you are less likely to experience problems.

Do not remove the earth connection from the console mains plug. The console chassis is connected to mains earth through the power cable to ensure your safety. Audio 0V is connected to the console chassis internally. If problems are encountered with earth loops operate the audio 'ground lift' switch on the power supply or connected equipment, or disconnect the cable screens at one end, usually at the destination.

Avoid induced interference. To prevent interference pickup keep audio cables away from mains power units, cables and distribution boards, motors, lighting and computer cables and equipment, and any other heavy duty electrical equipment. Where this cannot be avoided cross the audio and 'dirty' equipment cables at right angles to minimise interference.

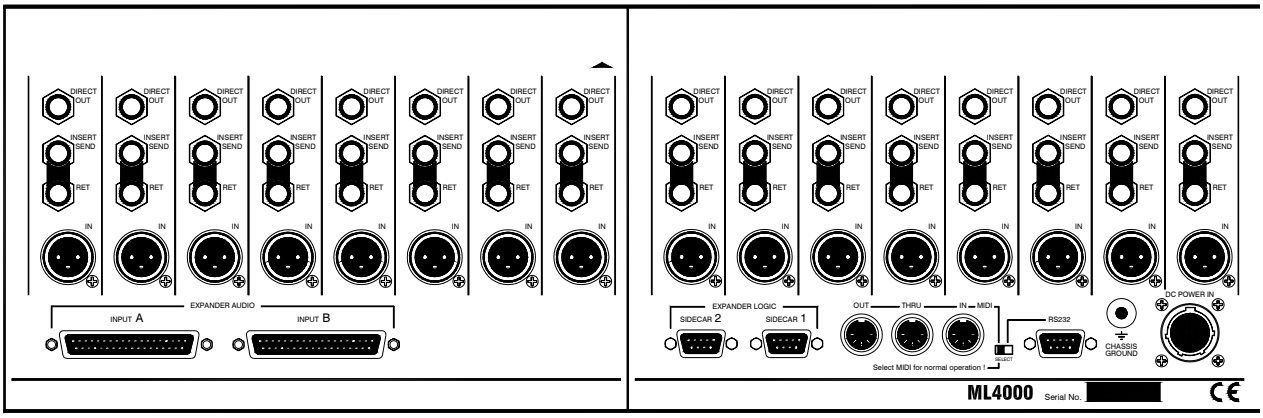
Use low impedance sources such as microphones and line level equipment rated at 200 ohms or less to reduce susceptibility to interference. The console outputs are designed to operate at very low impedance to minimise interference problems.

Use balanced connections where possible as these provide further immunity by cancelling out interference that may be picked up on long cable runs. To connect an unbalanced source to a balanced console input, link the cold input (XLR pin 3 or jack ring) to 0V earth (XLR pin 1 or jack sleeve) at the console. To connect a balanced console output to an unbalanced destination, link the cold output to 0V earth at the console.

Use good quality cables and connectors and check for correct wiring and reliable solder joints. Allow sufficient cable loop to prevent damage through stretching.

If you are not sure ... Contact your service or local Allen & Heath agent for advice.

Rear Panel Connections



IN. XLR input for mic or line level signals. Pin 2 hot. Phantom power is fed to pins 2 and 3 through 6k8 series resistors when the front panel +48V switch is pressed.

WARNING: Do not connect unbalanced sources or cables to the XLR inputs when phantom power is selected. To avoid loud clicks always turn the channel off by pressing the MUTE switch when switching +48V on or off and when plugging or unplugging microphones.

INSERT. Separate TRS jack sockets for send and return. The insert is post-HPF and pre-EQ. It can operate with both balanced or unbalanced line level equipment. The channel signal path is interrupted when you plug into the RETURN socket. You can tap off the pre-EQ signal without interrupting the signal path by plugging into the SEND socket.

DIRECT OUT. TRS jack providing the post-fade channel signal as standard. You can reconfigure the output as pre-fader or as post-fader with the AUX 1 send control as a level trim by repositioning internal jumper links. The output is ground compensated.

EXPANDER AUDIO. Two 37-pin D-connectors to connect the outputs of the expander sidecar into the main console. These provide inputs to all the mix busses and P/AFL system. They are balanced and operate at –2dBu. Up to two sidecars may be connected.

Note that the audio outputs of the first sidecar plugs into the second. The output of the second presents the combined mix to the main console.

The expander inputs conform to the Allen & Heath SYS-LINK II standard. You can connect to a console fitted with SYS-LINK I using special adapter cables. Contact Allen & Heath for details.

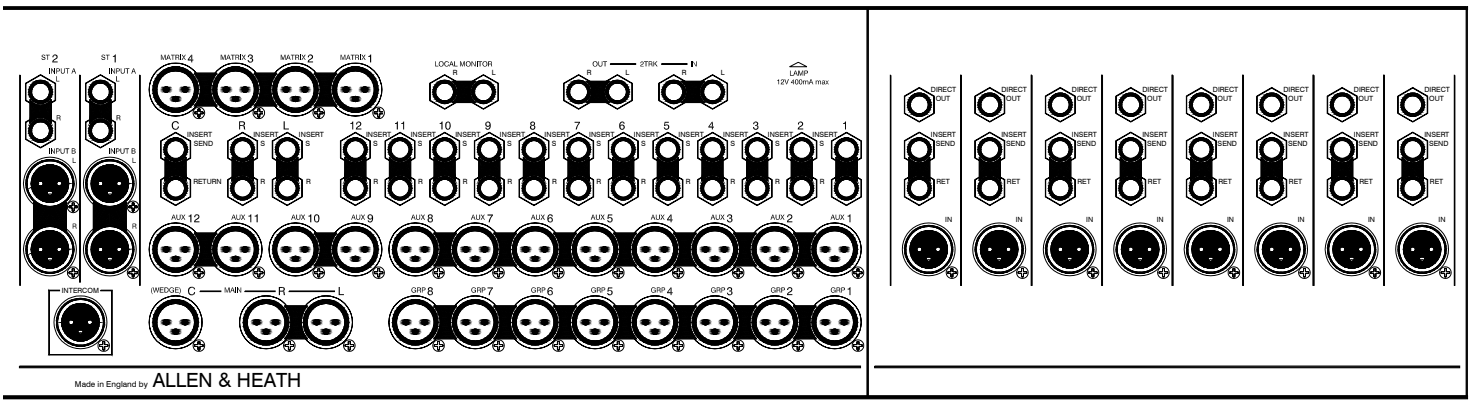
EXPANDER LOGIC. 9-pin D-connectors to link the expander sidecar and main console logic system. Up to two sidecars may be connected.

MIDI. Three standard opto-isolated 5-pin sockets for MIDI IN, OUT and THRU. The small slide switch selects either the MIDI or RS232 connection. For normal console operation it is recommended that the switch is set to MIDI. The power up boot routine is quicker in this position than RS232.

RS232. 9-pin D-connector to connect to the serial port of a PC for loading new console operating software or archiving the settings. To enable RS232 set the slide switch to the RS232 position. Set it back to the MIDI position when finished.

DC POWER IN. A heavy duty 7-pin connector with locking ring for connecting to the console power supply unit. A chassis ground terminal post is provided for situations that require earth strapping between equipment.

WARNING: Use only the DC power cable provided with the console.



STEREO IN. Each provides two balanced stereo inputs which can be selected independently or mixed into the channel, INPUT A on TRS jacks, INPUT B on XLR. These accept line level signals.

LOCAL MONITOR OUT. Ground compensated stereo monitor output on TRS jacks. These can connect to a stereo amplifier/speaker system for local monitoring.

2-TRACK IN / OUT. Line level TRS jacks to connect to a 2-track recorder such as MiniDisc, tape or DAT. Connect OUT to the recorder input, and IN to the recorder output. The connections are balanced. Link ring (cold) to sleeve (ground) when connecting to unbalanced equipment.

MAIN OUTPUTS. Line level balanced XLR outputs for the L, R and C main mix. Pin 2 hot. These outputs can provide up to +23dBu maximum and are suited to driving line level equipment operating at nominal 0dBu or +4dBu. The C output is available as the engineers wedge monitor feed when the front panel mode switch is selected.

GRP / AUX / MATRIX OUTPUTS. Line level balanced XLR outputs for Grp 1-8, Aux 1-12 and Matrix 1-4. Pin 2 hot. These outputs can provide up to +23dBu maximum and are suited to driving line level equipment operating at nominal 0dBu or +4dBu.

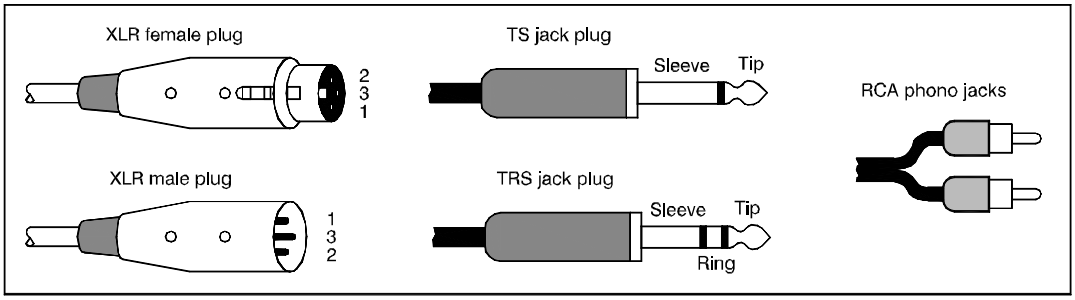
Note: The GRP and AUX output XLRs always remain on their respective connectors regardless of the setting of the front panel REVERSE switches.

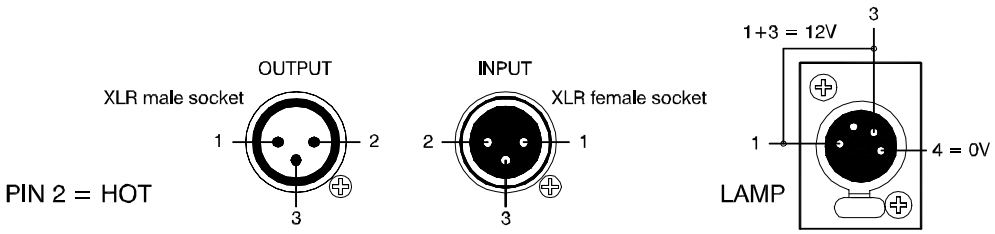
INSERTS. Each of the 8 mix and 3 main outputs has a pre master fader insert point. These provide separate TRS jack sockets for send and return. The mix signal path is interrupted when you plug into the RETURN socket. You can tap off the pre-fade signal without interrupting the signal path by plugging into the SEND socket.

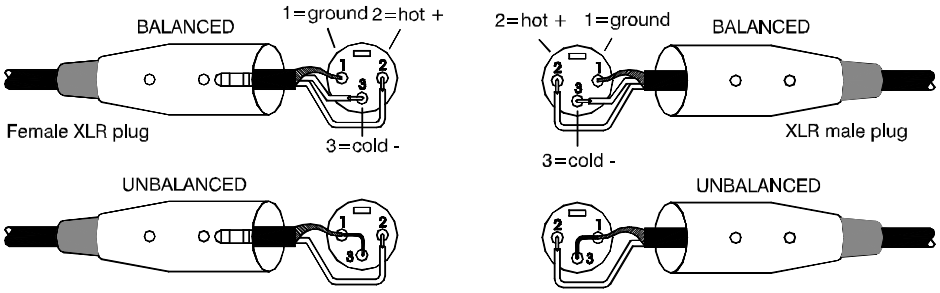
INTERCOM. Female XLR socket for connecting the console to a ClearCom compatible intercom system. An intercom headset is not required as the console headphones and talkback microphone are used. A standard 2-core shielded mic cable is suitable.

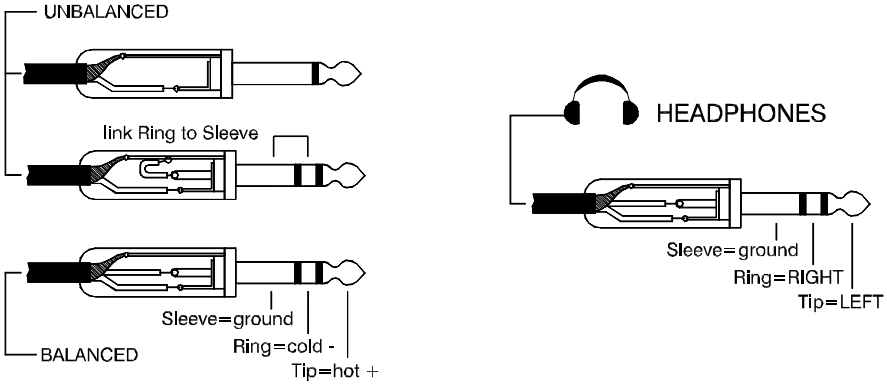
LAMP. 4-pin XLR for plugging in a gooseneck lamp to illuminate the control surface. Three lamp sockets are provided along the back of the meterpod. The right angled Littlite type is recommended. The 4-pin XLR prevents any confusion with the 3-pin audio connections.

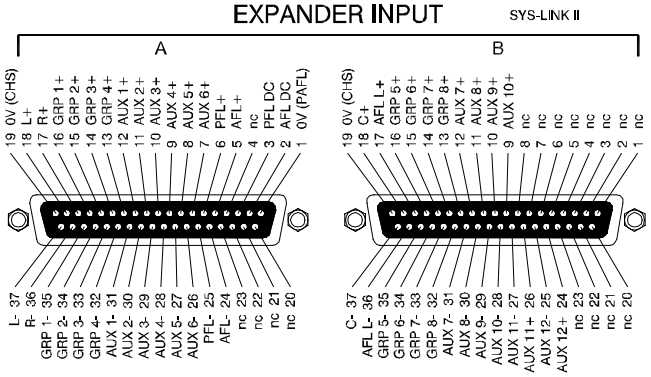
Audio Connector Types and Wiring











Gain Structure

How the levels between the different signal stages are set up is referred to as the gain structure. For best performance it is important that the connected source signals are matched to the 'normal operating level' of the console. Similarly the levels of the connected amplifiers and destination equipment should be correctly matched to the console outputs. If set too high then the signal peaks will be clipped resulting in distortion, and if set too low then the signal-to-noise performance will be degraded resulting in excessive background hiss and noise.

Using the Meters. The **ML4000** provides metering at all important stages through the signal chain. For best results operate the console with the LED bar meters averaging around '0' allowing the loudest moments to reach '+6'. Reduce the gain if the red peak LEDs start to flash. Note that the peak leds light 5dB before actual clipping to warn that you are nearing distortion and should reduce gain. The LED bar meters have a peak response with fast attack and slow release so that fast musical transients are accurately displayed. The VU meters have a slower attack so that the average levels are better displayed. Both types of metering are useful in live sound mixing.

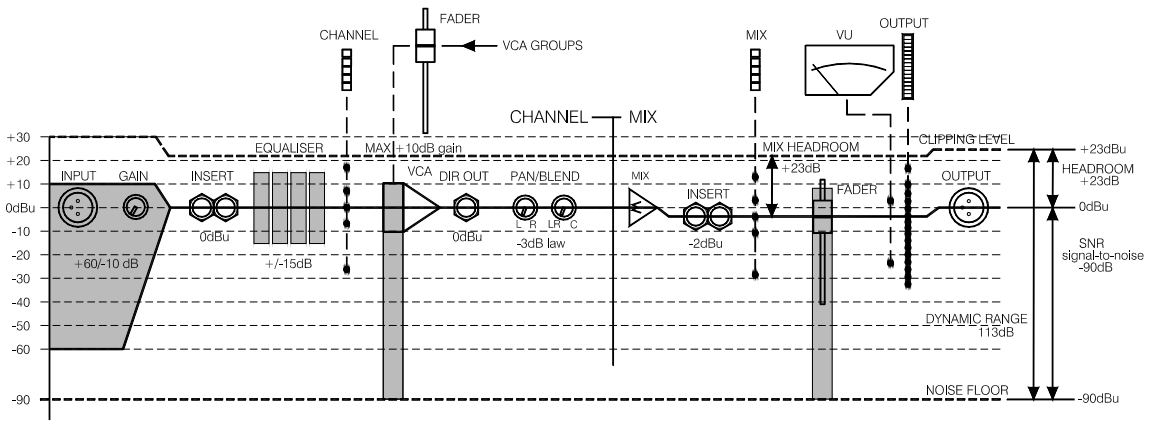
Matching a Source to the Console. Start by turning down the channel fader and send levels to prevent unexpected loud volumes reaching the main speakers and monitors. Adjust the GAIN control for an average '0' reading on the channel meter. Press PAFL (in PFL mode) to listen to the signal using headphones, local or wedge monitor, and to view its level on the main LED and VU meters. Once the gain is correctly set you can raise the levels to bring the channel into the mix. Note that you may need to adjust the gain if you make significant changes to the EQ. Make sure that any equipment inserted into the channel is set to operate around 0dBu line level. It is best to first set the gain with inserted signal processors such as compressors switched to bypass.

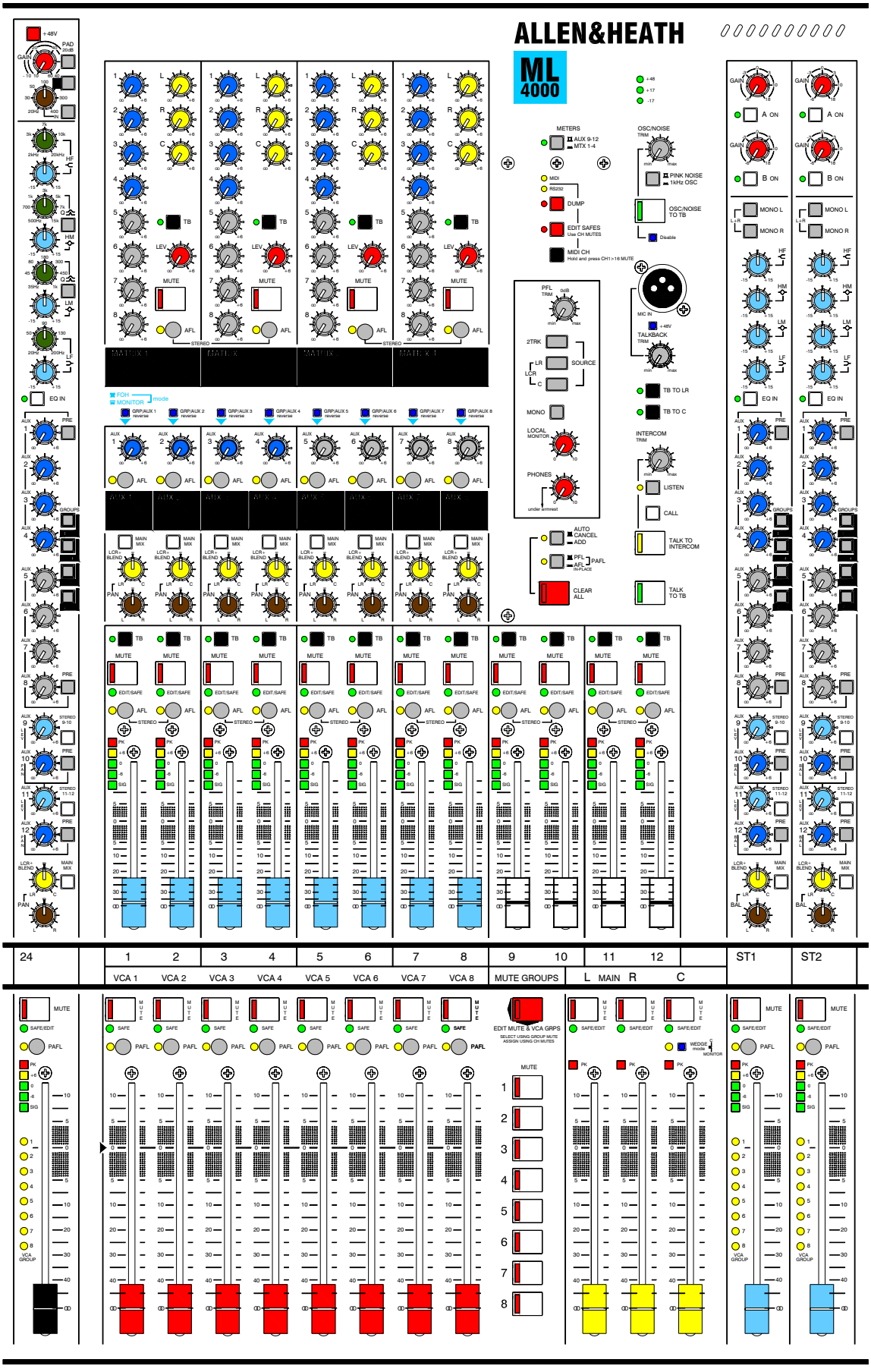
Matching the Console to Destination Equipment. The console produces a standard XLR output level of 0dBu for a meter reading of '0'. It can produce a maximum of +23dBu and is therefore well suited to driving equipment operating at nominal 0dBu or +4dBu while providing plenty of headroom. If you are connecting directly to a sensitive power amplifier it is advisable to turn down its input trim control if the normal console level is too high. Simply turning down the console output faders degrades the output stage noise performance and reduces the resolution of the fader movement. The output faders are best operated around '-10' to '0' for loudest average volume required. This allows plenty of additional headroom if you need it.

Terminology. The **normal operating level** is the optimum signal level for best console performance, indicated by '0' meter readings and resulting in the 0dBu output level. The channels operate at 0dBu and the mix stages at –2dBu for extended headroom. **Headroom** is the extra level available above normal to allow for loud peaks before the signal becomes **clipped** resulting in audible distortion. The **signal-to-noise ratio** (SNR) is the difference measured in dB between normal level and residual noise floor (hiss) produced by the console electronics. The **dynamic range** is the sum of headroom and SNR representing the maximum signal range possible from quietest to loudest.

Using the VCA Groups. Assigning a channel to one or more VCA groups lets those group faders control the level of its VCA element. Each fader provides up to +10dB boost. Note that the channel VCA allows a maximum combined fader boost of +10dB. Any more is simply ignored. It is best to operate the VCA group faders around their nominal '0' position. You can also use a VCA group to reduce the overall level of a hot mix without having to adjust all the channel faders.

Final word… A little care with setting gain structure throughout the signal chain will give you the very best performance and most manageable control of the mix.




ALLEN&HEATH
ML 4000
METERS
AUX 9-12
MTX 1-4
MIDI
RS232
DUMP
EDIT SAFES
Use CH MUTES
MIDI CH
Hold and press CH1>16 MUTE
OSC/NOISE TRIM
PINK NOISE
1kHz OSC
OSC/NOISE TO TB
Disable
MIC IN
+48V
TALKBACK TRIM
TB TO LR
TB TO C
INTERCOM TRIM
LISTEN
CALL
TALK TO INTERCOM
TALK TO TB
PFL TRIM
2TRK
SOURCE
MONO
LOCAL MONITOR
PHONES
AUTO CANCEL ADD
PFL AFL IN PLACE
PAFL
CLEAR ALL
A ON
B ON
MONO L
MONO R
EQ IN
GROUPS
MAIN MIX
MUTE
AFL
PAFL
SAFE
EDIT/SAFE
STEREO
VCA 1
VCA 2
VCA 3
VCA 4
VCA 5
VCA 6
VCA 7
VCA 8
MUTE GROUPS
L MAIN R
C
ST1
ST2
EDIT MUTE & VCA GRPS
SELECT USING GROUP MUTE ASSIGN USING CH MUTES
WEDGE MONITOR

MONO INPUT and EQ. The input preamp matches microphone or line level signals to the console. The sweepable high pass filter removes unwanted low frequency sounds below the selected frequency. The channel insert is post filter, pre EQ. A swept frequency 4 band equaliser provides shelving high and low bands with adjustable shelf frequency, and peak/dip high and low mid bands with adjustable centre frequency and switched Q. The filter and EQ can be independently switched in or out.

GRP/AUX SENDS. This section provides controls for the group routing and auxiliary sends. The groups are routed in pairs and affected by the pan control. The auxes are switched pre or post-fader as groups 1-4, 5-8, 9-10, 11-12. Auxes 9-12 can be configured as true stereo with level and pan controls. The pre-fade settings can be changed using internal jumper links.

MAIN MIX SENDS. A single switch routes the channel signal to the main L, R and C outputs. The balance between the three outputs is determined by the LCRplus™ pan and blend controls. This provides full 3 output imaging from each channel and group.

INPUT FADERS. Includes the channel fader, mute, signal meter and PAFL monitoring. The 8 VCA group assignments are displayed. VCA and mute group editing and channel safe selection is performed using the mute switch with green safe/edit indicator below. The channels can be monitored in mono PFL or stereo in-place AFL.

STEREO INPUT and EQ. The input preamp accepts two stereo sources with independent control of each. This allows selection of either or mixing together both sources. A fixed frequency 4 band equaliser provides shelving high and low bands and two peak/dip mid bands. The EQ can be switched in or out.

GRP/AUX 1-8 FADER MASTERS. These are the fader masters with inserts for channel sends 1-8, configurable using mode switches as audio group or pre/post aux masters. The groups can be routed to the main mix through LCRplus controls to create sub groups. LED meters display the pre-fade mix levels.

AUX 9-12 MASTERS. These are the fader masters with inserts for channel sends 9-12. They can be AFL'd in mono or stereo.

AUX/GRP 1-8 FADER MASTERS. These are the rotary masters for aux sends 1-8. They can be reversed with the group fader masters together with the inserts for full featured monitor mixing.

MAIN MIX FADERS. Provides separate master faders, mutes and inserts for the main L, R and C outputs. A mode switch configures the C output as the engineers wedge monitor feed for the stage monitor application.

MATRIX. This section provides all the controls for the 4 matrix outputs, including the source and master rotaries.

VCA GROUPS. These are the VCA group master faders, mutes and PAFL monitor switches. Mute and PAFL remotely activate the assigned channel switches. Channels are assigned to the groups using the edit key. The normal fader operating level is marked '0'.

MUTE GROUPS. These are the master keys that mute all channels assigned to the group. Channels are assigned using the edit key.

MIDI CONTROLS Keys and indicators to action a console data dump to external archiver via MIDI or RS232, make selected channels automation safe, and select the console MIDI channel number.

HEADPHONES / MONITOR. Provides source selection and independent control of the headphones and local monitor outputs.

PAFL CONTROL. This section controls how the intelligent PAFL system functions and provides the clear all key. Add or auto-cancel mode, and input PFL/AFL are selected here.

OSC/NOISE GENERATOR. Enables and selects a 1kHz tone or pink noise which can be routed to any output for line up or system testing.

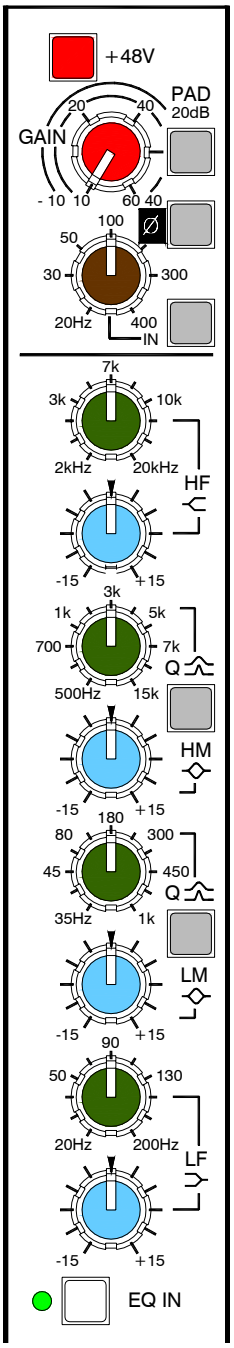
INTERCOM. The console talkback mic and headphones can be interfaced to a ClearCom compatible intercom system so eliminating the need for a separate intercom headset.

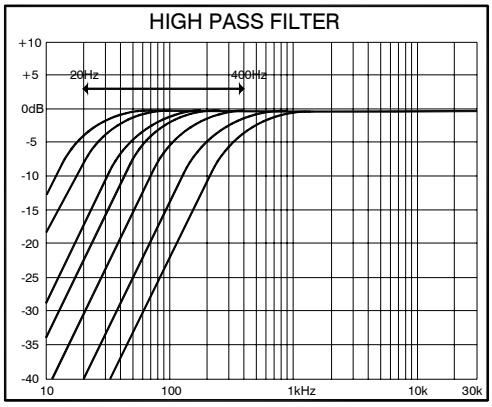
TALKBACK. Pressing the talk switch routes the talkback mic to any output with its TB enable switch selected.

GRP/AUX 1-8 METERS. These moving coil VU meters display the grp/aux 1-8 outputs.

LRC/PAFL METERS. The main L,R and C outputs are simultaneously displayed on both VU and LED bar meters. These switch to display any PFL or AFL when selected. The display is mono or mono+stereo depending on source. The large call lamp lights to warn when the intercom is signalled.

AUX 9-12 / MTX 1-4 METERS. These meters display either the aux 9-12 outputs or matrix 1-4 levels according to the setting of the meter select switch.





+48V. Switches +48VDC to the channel input XLR for powering microphones or DI boxes that need phantom power. The power is current limited through 6800 ohm resistors to pins 2 and 3.

WARNING Do not connect unbalanced sources or cables to inputs with phantom power selected. To avoid loud clicks always mute the channel before switching +48V on or off and when plugging or unplugging microphones.

GAIN. Adjusts the input sensitivity to match the connected source to the internal 0dBu operating level of the channel. Provides a variable 50dB range from +10 to +60dB gain. The gain should be set so that the channel meter averages '0' with loudest moments lighting '+6'. Reduce gain if the red peak meter lights.

PAD. Attenuates the input signal by 20dB for connection to high level microphone or line sources. When pad is selected the gain control adjusts from –10dB attenuation to +40dB gain.

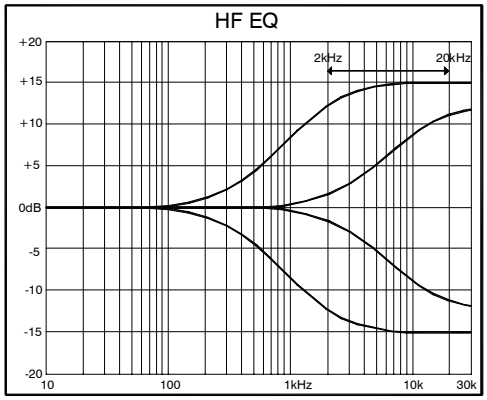
POLARITY. Reverses the polarity of the input signal. This is used to correct reverse wired cables or sources, and can be effective in reducing phasing problems between microphones or acoustic feedback between the microphone and loudspeakers.

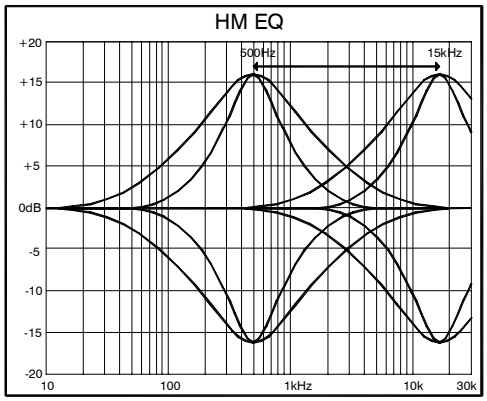
HPF FREQUENCY. Adjusts the cut off frequency of the high pass filter between 20Hz and 400Hz to reduce low frequency source noise. The filter attenuates frequencies below cut off by 12dB per octave.

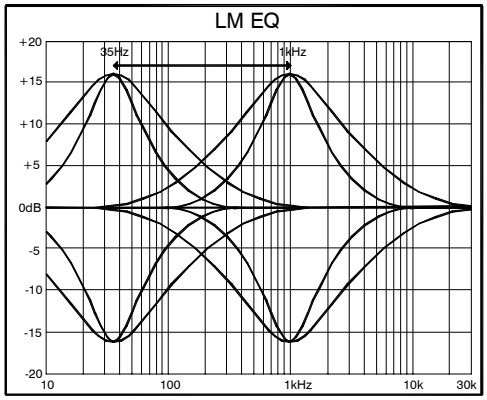
HPF IN. Switches the high pass filter in or out. When switched out the response extends to lower than 10Hz.

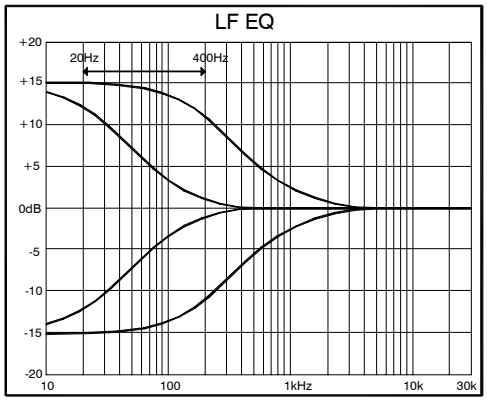
Using the Filter

Switch in the filter and adjust the cut off frequency to clean up sources that do not have much bass content, for example drum kit overheads (set to 400Hz), reduce proximity popping on vocals (set around 150Hz), reduce handling noise and stage rumble, or protect the speakers from very low frequency energy (set around 30 to 50Hz). Switch out to preserve full sub energy for low frequency sounds such as kick drum, bass and special effects.









EQUALISER. The channel equaliser provides adjustment of 4 independent frequency bands. Each has cut/boost and frequency sweep controls. HF and LF are shelving. HM and LM are peak/dip with switched Q control.

HF The high frequency band has a shelving response that cuts or boosts the higher (treble) frequencies by up to 15dB. The shelf turning point frequency can be adjusted from 2kHz to 20kHz.

HM The higher mid band has a bell shaped peak/dip response that cuts or boosts the higher mid frequencies by up to 15dB. The centre frequency can be adjusted from 500Hz to 15kHz. The width of the bell is set using the Q switch to either wide = 1 (switch up) or narrow = 2 (switch pressed). The higher setting has a more selective response better suited to enhancing a narrow range of frequencies or notching out a problem frequency.

LM The lower mid band is similar to the high mid but provides adjustment from 35Hz to 1kHz.

LF The low frequency band has a shelving response that cuts or boosts the lower (bass) frequencies by up to 15dB. The shelf turning point frequency can be adjusted from 20Hz to 200Hz.

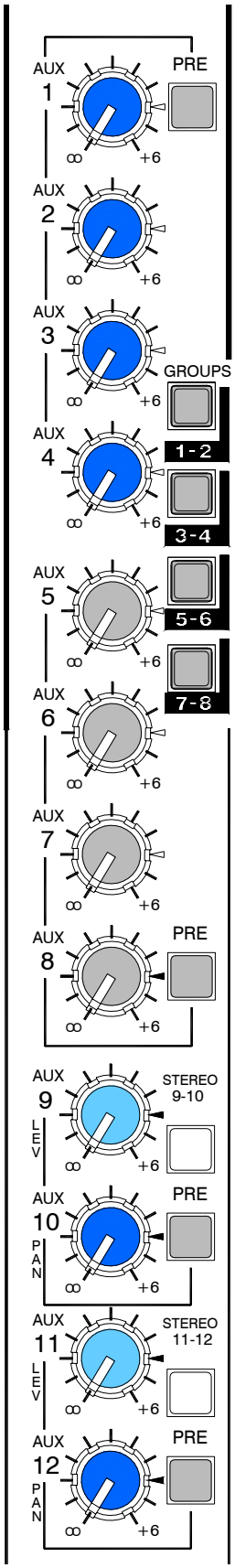
A8 **EQ IN**. Switches the equaliser in or out.

Using the Equaliser

The channel equaliser can be used to creatively enhance or correctively improve the tonal quality of the sound. For example, to brighten up a guitar so that it stands out in the mix, to cut back the boominess of the kick drum while enhancing the snap of the beater, or to notch out a ringing frequency associated with the position of a mic on stage to help increase its gain before feedback.

Before using the equaliser make sure you choose the best microphones for the job and place them to capture each sound accurately. Start with the EQ set flat and apply only as much boost or cut as is needed. Use low Q settings to affect a wide range of frequencies, and higher settings for more selective control, for example when notching out resonances or feedback. The HM and LM bands have an extended frequency range to overlap the HF and LF shelves. This allows tighter and more precise two point control of bass and treble where needed.

Use the in/out switch to compare the original and equalised sound. The equaliser has a flat response and therefore no effect when all the cut/boost controls are set to their centre detented position.



These controls send the channel signal to the audio groups 1-8 and aux sends 1-12. They are the same for both the mono and stereo channels.

ROUTING SWITCHES. These route the channel signal to the audio groups in pairs. The signal is post-fader and follows the pan control. Mono or stereo groups can be created using the pan control. The LCRplus blend control does not affect the signal routed to the groups.

AUX SEND 1-8. These rotary controls adjust how much channel signal is sent to the mono auxiliary outputs 1-8. The 0dB position is marked at 3 o'clock. An extra +6dB boost is available.

For the stereo channels the left and right signals are combined to provide a mono feed.

AUX SEND 9-16. These rotary controls adjust how much channel signal is sent to the mono/stereo auxiliary outputs 9-12. They function according to the position of the STEREO switches described below. An extra +6dB boost is available.

STEREO. These configure aux 9-12 in pairs for mono or stereo operation. In the up position they become independent mono sends. In the down position they become stereo pairs with separate level and pan controls.

For the stereo channels the left and right signals are combined to provide a mono feed when the switch is in the up position. When pressed the signal is routed in stereo to the pair of auxes.

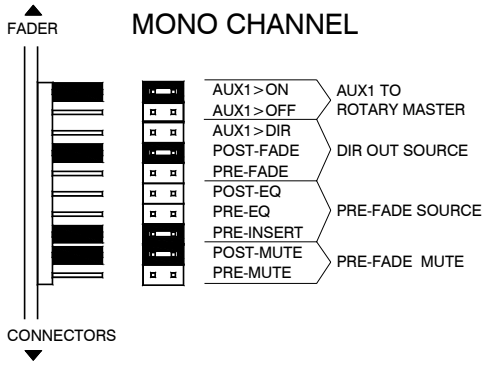
PRE. Switches the channel pre-fade signal to the auxiliary outputs. Aux 1-4 and 5-8 are switched in groups of four, aux 9-10 and 11-12 are switched in pairs. In the up position the source is post-fade. When pressed the source is pre-fade. The pre-fade source follows the setting of the internal jumper links.

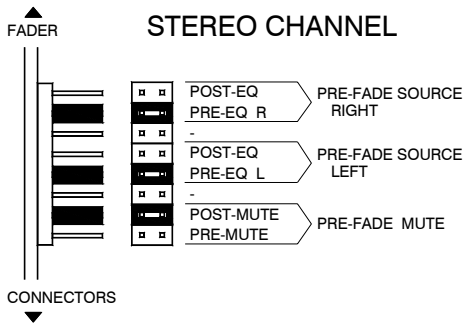
Internal Link Options

Several link options are available to satisfy user preferences. These require removal of the console base panels and replugging of 2way jumpers on the circuit boards. It is not necessary to remove assemblies from the console. To avoid damage to the internal assemblies this work should be carried out by competent technical personnel.

Pre-fade Source. The source for the pre-fade aux sends may be changed by repositioning jumper links on each mono and stereo channel. The default factory setting is pre-insert, pre-EQ, post-mute. This is usually preferred when mixing monitors from front-of-house. Select the source as pre-insert, pre-EQ, or post-EQ by setting one jumper. Select pre or post mute by setting another. Set pairs of links on the stereo channels to affect left and right signals.

Direct Output Source. The default factory setting is post-fade. This can be changed to pre-fade. Pre-fade follows the source as described above. An additional option sources the output from the AUX1 send control. This provides a post-fade direct output with level trim. If preferred, the channel feed to the AUX1 rotary master can be disabled so that adjusting the direct output level does not feed the mix. Note that this does not affect the AUX1 send to the fader master when aux mode is selected. Select the source as pre-fade, post-fade, or post-fade with AUX1 trim by setting its jumper. Set another jumper to turn the AUX1 feed to the rotary master on or off as required.





Using the GRP/AUX Sends

Configure the underpanel mode switches above the master faders according to the number of fader controlled audio groups you need. This is typically fewer on a VCA equipped console where it is determined by the number of group processors you want to insert or the number of groups needed to feed the matrix, rather than the group level control required. The remaining output faders can be configured as masters for the related aux sends. The associated groups swap with these auxes and are available on their rotary masters.

Audio Groups. These let you route channels to independent outputs, mix into the matrix, or insert a common signal processor to affect more than one signal, for example a compressor on a vocal group. 8 Groups are available. Route the channel signal by pressing one or more group switches. For mono groups set the PAN control to odd or even according to the group you wish to feed. For stereo position the PAN control according to the stereo image required.

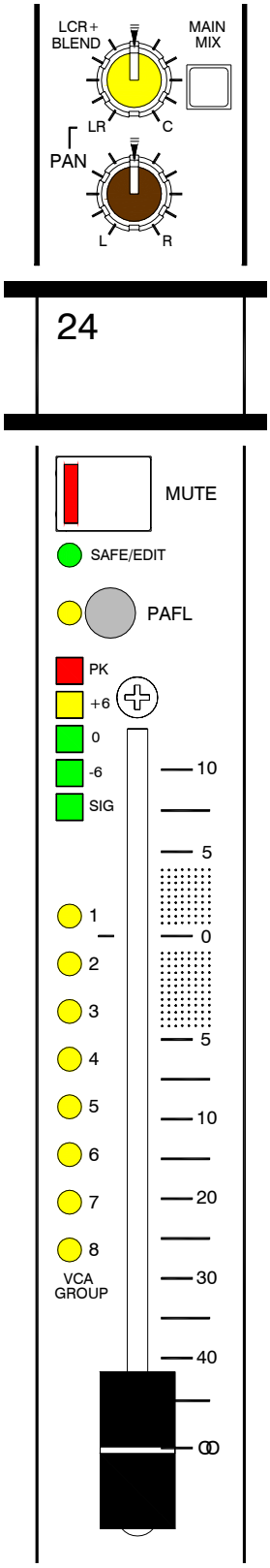
Effects Sends. Use post-fade aux sends to feed effects processors such as reverb. This ensures that the balance between the dry and effect signals is always maintained regardless of channel fader position. The output of the processor should be returned to the mix through another channel, typically a stereo input.

Monitor Sends. Use aux sends to provide independent monitor mixes to the performers, MD, backstage crew and so on. These may feed stage wedges, side fills, hotspot speakers, headphones and in-ear monitors, and may be mono or stereo. Aux 9-12 have full featured fader masters. For similar aux 1-8 control with faders, meters, inserts and automation configure the master section underpanel mode switches as required.

Select pre-fade when mixing monitors from front-of-house so that the main mix does not affect the monitors. However, you may prefer to set some channels post-fade, for example to avoid backstage pickup when working with radio microphones. Select post-fade when using the console for dedicated monitor mixing so that the channel fader becomes the master for that signal to all mixes.

Up to 2 stereo monitors may be configured by selecting the channel STEREO switches. This provides separate level and pan controls and is ideal for in-ear monitoring.

Special Sends. The aux sends can be used for any application where an independent mix is required. Select pre or post-fade and mono or stereo as required.



MAIN MIX. A single switch routes the channel signal to the 3 output main mix. Its balance and image within the L, R and C outputs is determined by the BLEND and PAN controls.

BLEND. This control adjusts the balance between the LR and C outputs. Fully anti-clockwise all the signal routes to the LR outputs and none to C. At the detented centre position the signal routes equally to the LR and C outputs. Fully clockwise all signal routes to the C output and none to LR. BLEND does not affect the group routing. The control has a 3dB attenuation at centre position. The stereo channels route stereo to LR and sum the signal in mono to C.

PAN. Adjusts the balance between the L and R outputs. It does not affect the C output. At the detented centre position the signal routes equally to L and R. PAN and BLEND combine to adjust the balance between the 3 outputs. PAN also adjusts the balance between odd and even groups if the GRP PAN ON switch is selected. The control has a 3dB attenuation at centre position.

IDENT STRIP. Identifies the channel numbers and provides a write-on area. The use of low adhesion artist or masking tape is recommended.

MUTE. This momentary action switch turns the channel signal on or off. Both pre and post-fade signals are affected unless the pre-fade pre-mute setting has been internally configured. The channel can also be muted by the mute groups, VCA group mutes, snapshot memories (externally controlled) and MIDI note on/off messages. The switch illuminates when the channel is muted.

The switch also functions as an edit key when in EDIT GROUPS, EDIT SAFES or MIDI CHANNEL SELECT mode. The channel mute status is always displayed on the switch regardless of mode.

SAFE / EDIT. This green LED has a different function according to console operating mode:

Normal The LED lights when the channel has been made safe from the snapshot and MIDI automation.

Edit Safes Continues to indicate which channels are automation safe while they are edited.

Edit Groups The LED lights to indicate that the channel is assigned to the VCA or MUTE group.

Edit MIDI Channel Number The LED flashes to indicate which MIDI channel has been selected for the console. This affects only CH1 to 16.

PAFL. Press this switch to listen to the channel signal in the headphones or engineers monitor without affecting the main outputs.

Either PFL or stereo in-place AFL. Either PFL (pre-fade listen) or AFL (after-fade listen) is selected according to the master section INPUT PAFL switch. PFL is mono. AFL is stereo 'in-place' as it provides a stereo mix of L and R with C mixed into both. This lets you listen to the image of the signal in the 3 output main mix using the console stereo headphones and monitor.

Latching or momentary action. The switch provides latching or momentary action depending on how long it is held down. Press and hold for longer than 1 second for momentary action.

PAFL override monitor. Pressing any input PAFL automatically overrides any currently selected output AFL or monitor source. Releasing PAFL restores that selection.

Auto cancel or Add mode. The master section ADD MODE switch determines if pressing a channel PAFL cancels or adds to any previous selection.

Clear all. Pressing the master section CLEAR ALL switch turns off any PAFL / AFL switches selected and restores the monitor source.

INPUT SIGNAL METER. The 5 LED bar meter displays the pre-fade signal level. SIG lights to display signal presence at –26dB, -6, 0 and +6 display normal signal level, and PK (peak) lights when the signal is within 5dB of clipping. PK senses the signal at 4 critical stages in the signal path, pre-insert, pre-EQ, pre-fader and post-fader, to warn of potential overload. PK can flash, for example, if the preamp is clipping while signal reads low due to attenuation through an inserted processor.

VCA GROUP Indicators. These LEDs light to show which VCA groups the channel is assigned to. The channel can be assigned to more than one group. The channel is assigned or removed from a group using the EDIT GROUPS function in the VCA master section. The LEDs always show VCA group assignment.

FADER. A 100mm smooth travel ALPS K-fader is fitted providing +10dB gain above the nominal 0dB operating position. Audio is not passed through the fader. Instead, its position is read by the console computer which produces a DC voltage to control the level of the channel VCA (voltage controlled amplifier).

Removing the Fader

The vertical, offset shaft design of the fader reduces the risk of damage through dust and liquid spillage. The fader should provide long life subject to the usual wear and tear and not normally require servicing or replacement. If necessary, access to the faders is by removal of the fader module from the top of the console. First unclip and lift away the plastic ident strip. Undo the fader panel crosshead screws and lift the module up being careful not to damage the circuit assemblies and cables. The fader can be unscrewed, its harness unplugged, and then removed by sliding it out of the assembly.

Checking the Channel Signal Level

When plugging in a new source start with the channel muted or fader and sends turned down. This prevents any unexpected signal in the loudspeakers. Adjust the channel GAIN control for an average channel meter reading of '0' with loud moments lighting '+6'. Select PAD if the signal is still too high with gain turned down. Reduce the gain if the signal meter red PK LED lights. It may be necessary to re-adjust the gain if changes are made to the equaliser or inserted signal processing. If the PK LED lights with channel meter reading low then check the channel for correct gain structure, in particular the equaliser and inserted equipment settings.

Set the master INPUT PAFL switch for PFL and select channel PAFL to check the signal quality in the headphones while the fader is off. The signal is also displayed on the main VU and LED bar meters providing finer resolution and dynamic display.

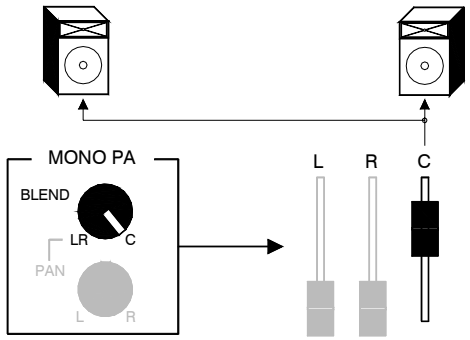
Using LCRplus

The **ML4000** LCRplus system extends signal imaging beyond conventional LR and LCR panning by allowing full 3 speaker balance and positioning from each channel and group. This satisfies the standard requirements of mono, stereo and conventional LCR speaker systems as well as providing a unique extended capability.

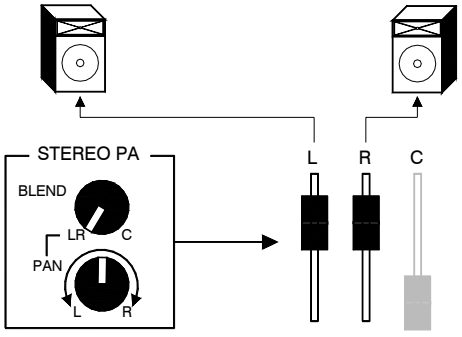
The MAIN MIX. This comprises 3 outputs: L (left), R (right) and C (centre). How you use these depends on the type of sound system you are running. For example, you may use all for a 3 cluster LCR system, just L and R for a conventional stereo system, or C only for a mono system.

PAN and BLEND. These are the two imaging controls that let you position the sound anywhere in the three output mix. For example, it could be balanced in all three outputs, somewhere between any two, or routed to just one. The controls have a smooth response with 3dB centre attenuation to ensure that the power is distributed evenly between the speakers as you move the signal around.

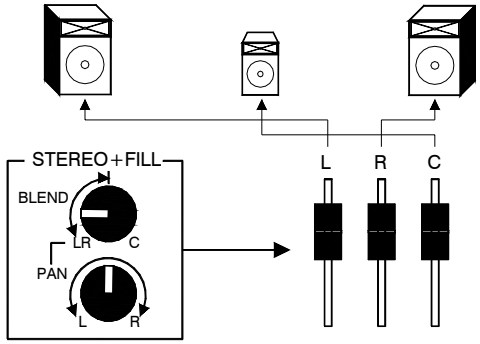
MONO PA. To control a mono sound system using a single master fader, set BLEND fully clockwise to route all the channel signal to the C output. The LR outputs are not used and PAN has no effect.



STEREO PA. To control a stereo sound system, set BLEND fully anticlockwise to route the signal to LR only. Use PAN to position the sound between the speakers. The C output is not used.

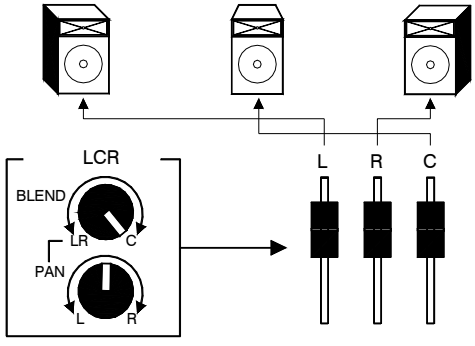


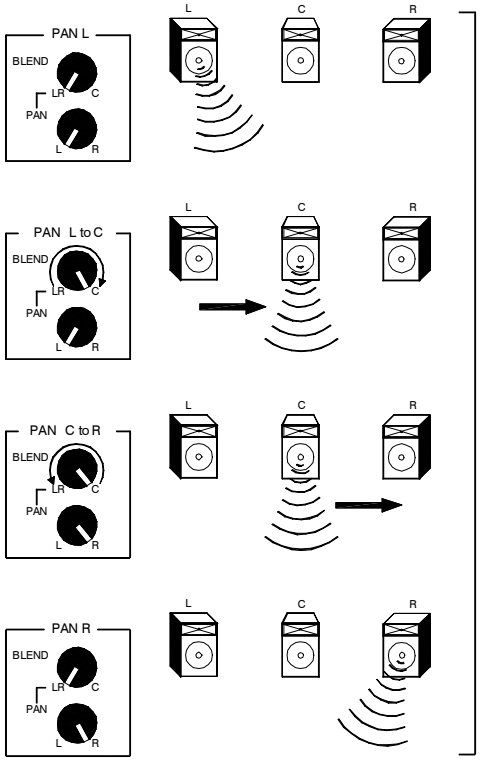
STEREO + CENTRE FILL. A centre fill speaker is used to reinforce the sound to the first few rows of the audience when the L and R speakers are positioned far apart. Start with BLEND fully anticlockwise to set up the main LR mix. Then gradually rotate BLEND clockwise to raise the signal in the fill speaker as required. It should not be necessary to adjust beyond the centre position at which point equal signal is fed to all 3 outputs. Beyond centre the LR signal would drop significantly. Having LCRplus available on every channel and group means that you can choose which signals are reinforced, for example the back stage mics rather than the front floats which would feed back if routed to the fill.



LCR PA. LCR systems are increasingly popular in large installed or touring systems. They comprise three main speaker stacks, left, centre and right to provide better coverage of a large audience. In some situations C is used only for sounds such as vocals to lift them out of the mix making them more intelligible, leaving backing instruments in the LR speakers. In other situations individual sounds are panned between the speakers according to source position.

Adjust both BLEND and PAN to position each sound exactly where you want it whether in one speaker, between two, or blended across all three. Use BLEND to balance between the LR and C speakers. Use PAN to adjust the balance between the L and R speakers. PAN does not affect the level of the C output.





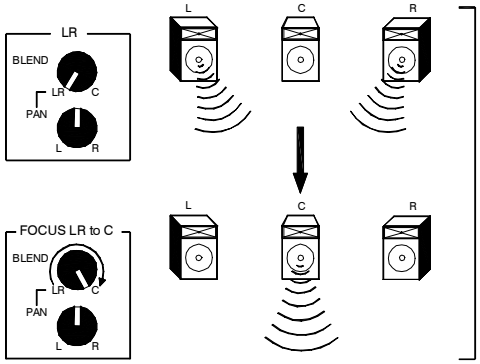
Positioning the Sound. Use the PAN and BLEND controls to position the sound within the LCR image. It is possible to dynamically move the sound using the two controls together but this is not a common requirement in real world systems. For example, dynamically panning an actor as he moves across a theatre stage may be uncomfortable for the front row listeners who hears the voice move from say the left speaker upwards to the hung centre speaker, and then back down to the right rather than evenly across the stage. Static positioning is more common in the theatre situation where the ear adjusts to and accepts the source of the sound.

PAN L. To position the sound at the left speaker only set PAN fully left and BLEND to LR.

PAN L to C. To position the sound between the left and centre speaker set PAN fully left and adjust BLEND clockwise from LR to C.

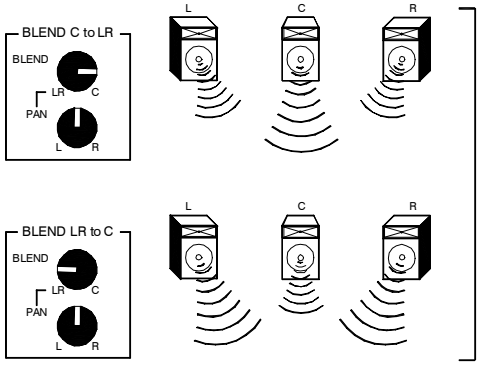
PAN C to R. To position the sound between the centre and right speaker set PAN fully right and adjust BLEND anticlockwise from C back to LR.

PAN R. To position the sound at the right speaker only set PAN fully right and BLEND to LR.



Focussing the Sound. Typically, a large music venue or festival may use an LCR system with vocals and key sounds such as kick and bass fed to the main centre cluster and backing instruments fed to the LR stacks. This helps the clarity and intelligibility of these sounds.

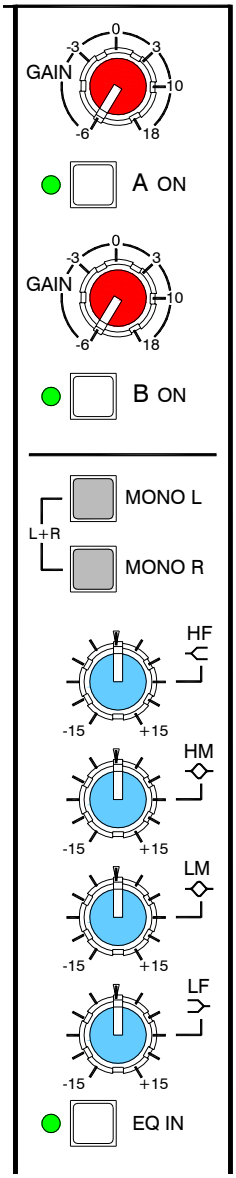
Use BLEND to position each sound in the LR or C speakers. You can dynamically bring a sound forward by panning it from LR to C. For example, use this to improve the focus of a backing instrument such as guitar for the duration of a lead solo. Pan it back from C to LR again after the solo.

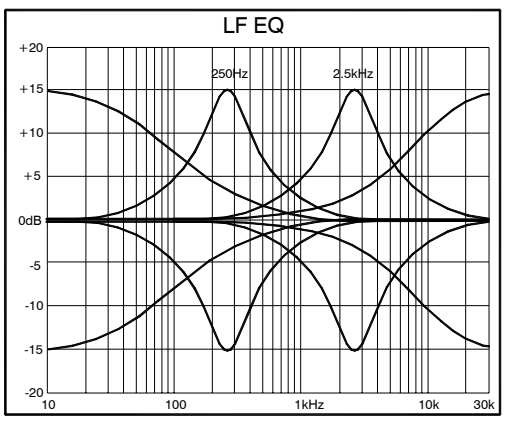


Blending the Sound between Speakers. In non-ideal situations where the three speakers do not cover all the audience evenly, a small portion of centre cluster lead sounds such as vocals can be blended into the LR stacks so improving coverage. Similarly, LR sounds can be blended into the centre cluster.

Using the two controls you can adjust the balance smoothly listening to the results and being able to make small changes without the big jumps in volume associated with switched routing.

While you could use the matrix to balance groups of sounds between the speakers, LCRplus lets you balance the image independently for each sound.





Two dual input stereo channels are provided to the right of the master section on standard models. A further four are provided to the right of this on the optional 'B' version consoles. These extra four stereos replace the standard model mono channels.

GAIN. Adjusts the input sensitivity to match the connected line level source to the internal 0dBu operating level of the channel. Provides a variable 24dB range from –6dB attenuation to +18dB gain. Inputs A and B have independent gain controls so that you can switch between sources without having to re-adjust the gain, or mix them together in the required balance. The gain should be set so that the channel meter averages '0' with loudest moments lighting '+6'. Reduce gain if the red peak meter lights.

A (B) ON. Turns the input source on or off. Source A and B are mixed together when A ON and B ON are both pressed. No source is selected if both switches are off.

MONO L (R). With both switches up the selected source is routed through the channel in stereo. Press MONO L to select the left input as a mono source. Press MONO R to select the right input as a mono source. Press both switches to sum the left and right inputs together as a mono source.

EQUALISER. The stereo channel equaliser provides adjustment of 4 independent frequency bands. Each has a cut /boost control.

HF The high frequency band has a shelving response that cuts or boosts the higher (treble) frequencies by up to 15dB. The shelf turning point is 12kHz.

HM The higher mid band has a bell shaped peak/dip response that cuts or boosts by up to 15dB. The centre frequency is 2.5kHz. The bell has a Q (width) of 1.8.

LM The lower mid band is similar to the high mid but has a lower centre frequency at 250Hz.

LF The low frequency band has a shelving response that cuts or boosts the lower (bass) frequencies by up to 15dB. The shelf turning point is 60Hz.

E5 **EQ IN**. Switches the equaliser in or out.

Using the Dual Inputs.

The 2 (6 optional) stereo channels let you connect up to 4 (12 optional) stereo sources. Two sources may be plugged into each channel strip. Either may be selected or both can be mixed together as a common source.

The possibilities are endless. The advantage is that you can connect many stereo sources without wasting channels. Here are a few examples:

Effects Returns. Typical application of the stereo channels is to return the processed output from effects devices such as reverb and multi-effects units. With full routing available you can send the effects to the main mix, groups and auxes as required. The LCRplus panning lets you position the stereo return in the 3 speaker mix, for example reverb mostly to LR with a little blended to C. Too much returned to C may affect intelligibility. The signal routes in stereo to LR but sums into mono when blended to C.

To save channels you could return two effects to the same stereo strip, adjusting the gain separately for each. This is convenient when you are working with several effects returned to the same mix, for example different reverbs.

Stereo Playback. You may have a CD player for walk-in music and a DAT or similar player for pre-recorded announcements. You could connect both to the same stereo channel and simply start the player, or switch the A or B input on, as required.

Sound Effects. Here, you could connect two effects players such as MiniDisc to the same stereo channel. This lets you handle quick fire cues using two machines rather than trying to cue up a single player. Alternatively this could be used for a backup machine.

Using Mono Sources

The stereo channels can also be used with mono line level sources. Plug into either the left or right channel connector and select MONO L or MONO R as appropriate.

Alternatively, use these switches to select one track of a backing or dual track tape where different material is recorded on each track, for example a song recorded with vocals on one and instruments on the other.

You can also mono a stereo source by pressing both MONO L and MONO R together. Use this when the stereo image is too wide or not appropriate for the application.

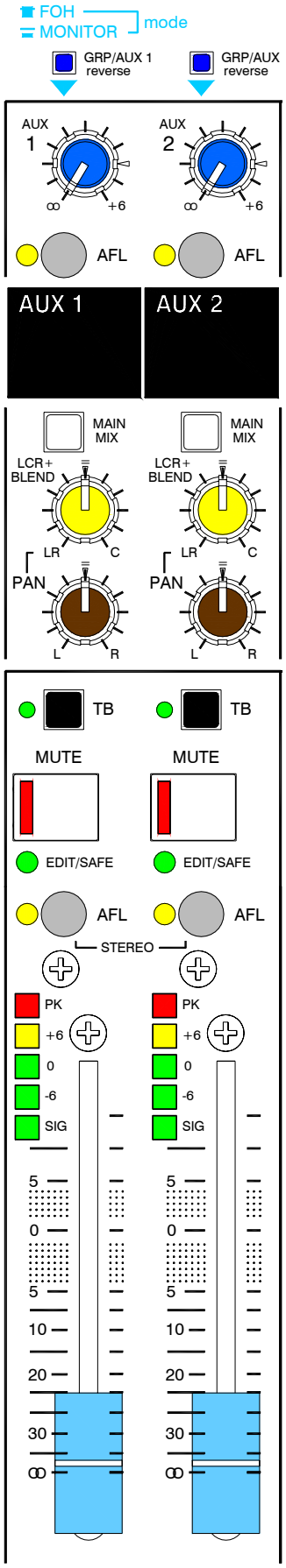
Using the Equaliser

The channel equaliser can be used to creatively enhance or correctively improve the tonal quality of the sound. For example, to brighten up a dull sound so that it stands out in the mix, to cut back rumble or hiss on a noisy reverb, or to shape the response of low level walk-in music.

Before using the equaliser make sure that the source is correctly adjusted, especially if it includes its own filters or EQ. Start with the EQ set flat and apply only as much boost or cut as is needed.

Use HF to add sparkle to the sound, or to remove hiss. HM centred around 2.5kHz can be used to add presence and improve intelligibility by brightening up the sound and helping it cut through the mix. LM centred around 250Hz can be used to add warmth or reduce low frequency boominess. Use LF to add punch to the low end, or to remove source rumble and low frequency noise.

Use the in/out switch to compare the original and equalised sound. The equaliser has a flat response and therefore no effect when all the cut/boost controls are set to their centre detented position.



AUX/GRP MODE. This switch reverses the group fader and aux rotary master sections. It is underpanel to protect it from accidental operation. Use a pen or pointed implement to select the required setting. The default up position is flush with the panel.

In the up position **FOH MODE** is selected. This is the default setting for the front-of-house application. In FOH mode the fader master section and insert are associated with the audio group while the rotary master is associated with the aux send.

In the pressed position **MONITOR MODE** is selected. This reverses the fader and rotary master so that the fader master section and insert are associated with the aux send while the rotary master is associated with the group. The group always feeds the matrix and sub grouping to main mix regardless of mode.

AUX ROTARY MASTER. Adjusts the aux master output level from fully off to a maximum boost of +6dB. The normal '0' position is marked. This becomes the group master when MONITOR mode is configured.

AFL. Press this switch to listen to the master signal in the headphones or engineers monitor without affecting the main outputs. The signal is monitored post-level so that the signal feeding the connected equipment can be checked. The same capabilities apply as described for the fader master AFL.

MAIN MIX. A single switch routes each group 1-8 signal to the 3 output main mix. Select this to create up to 8 subgroups to the main mix. Its balance and image within the L, R and C outputs is determined by the BLEND and PAN controls. The group always feeds this sub grouping to main mix regardless of mode.

BLEND. This control adjusts the balance between the LR and C outputs. Fully anti-clockwise all the signal routes to the LR outputs and none to C. At the detented centre position the signal routes equally to the LR and C outputs. Fully clockwise all signal routes to the C output and none to LR. The control has a 3dB attenuation at centre position.

PAN. Adjusts the balance between the L and R outputs. It does not affect the C output. At the detented centre position the signal routes equally to L and R. PAN and BLEND combine to adjust the balance between the 3 outputs. The control has a 3dB attenuation at centre position.

FADER MASTER. A 60mm smooth travel fader is fitted providing +10dB gain above the nominal 0dB operating position. These faders control the output level of group/aux 1-12. They are not part of the console VCA group system.

TB ENABLE. Press these to enable talkback to any combination of grp/aux master outputs. When selected, pressing the TALK TO TB switch routes the talkback mic signal, or pressing the OSC/NOISE TO TB switch routes the oscillator/noise generator signal to the output. When not selected, pressing these switches does not affect the output. The talkback and osc/noise signals are routed pre-insert.

MUTE. This momentary action switch turns the grp/aux master signal on or off. The master can also be muted by the mute groups, VCA group mutes, snapshot memories (externally controlled), and MIDI note on/off messages. The switch illuminates when the signal is muted.

The switch also functions as an edit key when in EDIT GROUPS or EDIT SAFES mode. The mute status is always displayed on the switch regardless of mode.

SAFE / EDIT. This green LED has a different function according to console mode:

Normal The LED lights when the master has been made safe from the snapshot and MIDI automation.

Edit Safes Continues to indicate which masters are automation safe while they are edited.

Edit Groups The LED lights to indicate that the master is assigned to the MUTE group.

MIX SIGNAL METER. The 5 LED bar meter displays the post-mute, pre-fade mix signal level. SIG lights to display signal presence at –26dB, -6, 0 and +6 display normal signal level, and PK (peak) lights when the signal is within 5dB of clipping. PK senses the signal pre and post-fader to warn of potential overload.

If the red PK LED lights check the channels feeding the mix for correct operating level and reduce the input level if necessary. You can use VCA groups to simultaneously control the level of more than one channel. Also check inserted processing for correct operating level.

PFL/AFL Monitoring

The **ML4000** intelligent P/AFL system provides the following operating capabilities:

Mono or stereo AFL. Press a single AFL switch to listen to that master as a mono signal fed to both left and right channels of the headphones and local monitor. Press two related AFL switches together to listen to a related pair in stereo, ideal when checking in-ear monitor mixes. The odd number master is fed to the left channel, even to right.

Latching or momentary action. The switch provides latching or momentary action depending on how long it is held down. Press and hold for longer than 1 second for momentary action.

AFL override monitor. Pressing any master AFL automatically overrides the currently selected monitor source. Releasing AFL restores that selection.

PAFL override AFL. Pressing any channel PAFL overrides the current AFL selection. Releasing PAFL restores AFL.

AFL cancel PAFL. Pressing an AFL while one or more PAFL is selected cancels that PAFL selection and selects the AFL.

Auto cancel or Add mode. The master section ADD MODE switch determines if pressing a channel PAFL cancels or adds to any previous selection.

Clear all. Pressing the master section CLEAR ALL switch turns off any PAFL / AFL switches selected and restores the monitor source.

AFL. Press this switch to listen to the master signal in the headphones or engineers monitor without affecting the main outputs. The signal is monitored post-insert, post-fader, pre-mute so that any adjustments made to the faders or inserted processing such as EQ can be checked.

IDENT STRIP. Identifies the master numbers and provides a write-on area. The use of low adhesion artist or masking tape is recommended.

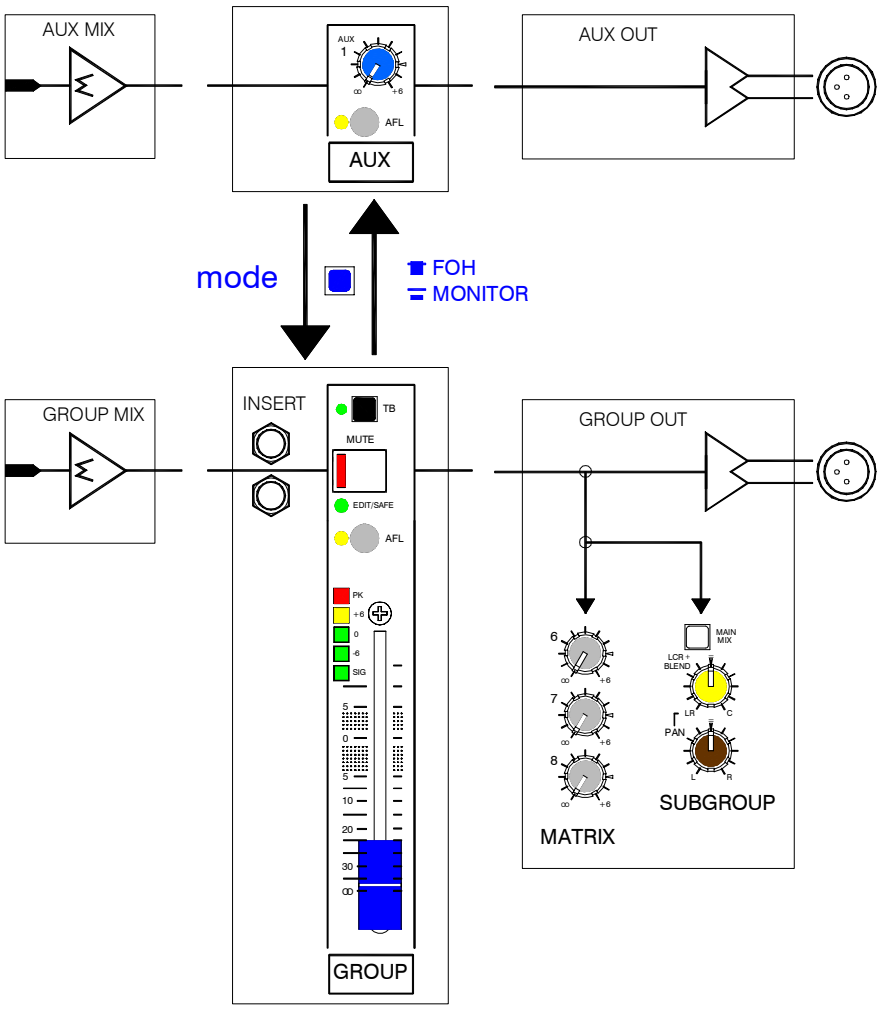
Configuring Groups and Auxes

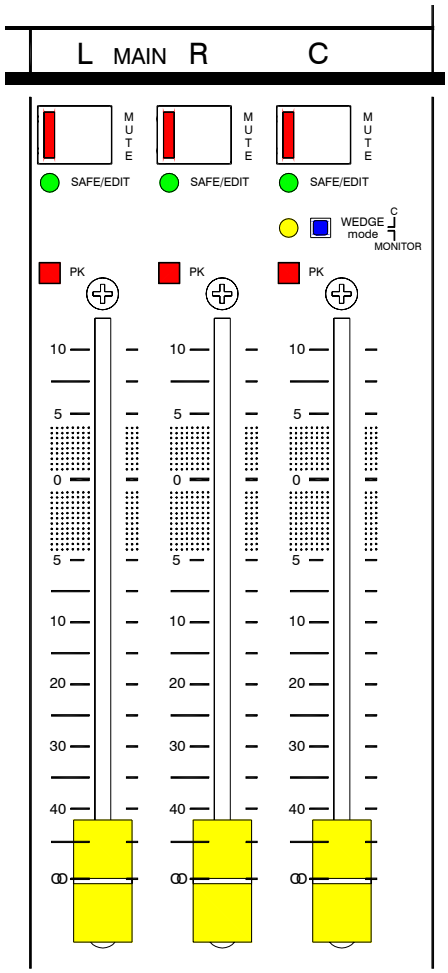
Decide the application of the console whether front-of-house or monitor or doing both jobs. Decide the number of audio groups required. The rest can be configured as fader controlled auxes.

Front-of-House. This is the application with all mode switches in their default up position. This provides 8 audio groups with paired routing switches and LCRplus™ sub grouping, 8 mono auxes switchable pre or post-fader on rotary masters for effects and monitor sends, and a further 4 mono/stereo auxes on faders for more effects, monitors and special feeds. The groups can be mixed to the 4 matrix outputs. If you do not need fader control on all 8 groups then you can press the mode switches to configure fader controlled aux sends with inserts.

Stage Monitor. Press mode switches to configure the C fader as the engineers wedge monitor, and to configure the number of fader controlled monitor mixes you need up to a maximum of 12. The rest can be used for effects sends. Up to 2 stereo mixes can be configured, for example when in-ear monitor mixing. Each mix provides an insert for patching in an equaliser or other signal processing, full metering, mono or stereo AFL, and talkback enable. The groups are available on the rotary masters if required.

The diagram below shows how the fader master section together with its insert point reverses with the rotary master section when the mode switch is pressed. The Aux and Group output XLR connectors do not reverse. The matrix and sub grouping is always fed from the group signal regardless of mode.





Using the Engineers Wedge Monitor

It is best to use the same type of monitor speaker as provided on stage. This lets the engineer hear the sound as the performer hears it.

Select the underpanel WEDGE MODE switch to configure the C output as the engineers wedge monitor. Use the insert to patch in any processing required, for example a graphic EQ to preview changes in the monitor before applying them to the mix being checked.

Select LR, C, 2-TRK or none as the default monitor source. Pressing AFL overrides the source to listen to a selected output. Pressing PAFL overrides any AFL selection to check one or more inputs. Releasing PAFL restores the previously selected AFL. This is well suited to monitor mixing where you need to listen to the mixes in turn but quickly check individual inputs along the way.

Pressing the TALK TO TB switch automatically dims the output by 20dB to prevent feedback between the local speaker and talkback mic.

MUTE. This momentary action switch turns the master signal on or off. It can also be muted by the mute groups, snapshot memories (externally controlled) and MIDI note on/off messages. The switch illuminates when the signal is muted.

The switch also functions as an edit key when in EDIT GROUPS or EDIT SAFES mode. The mute status is always displayed on the switch regardless of operating mode.

SAFE / EDIT. This green LED has a different function according to console mode:

Normal The LED lights when the master has been made safe from the snapshot and MIDI automation.

Edit Safes Continues to indicate which masters are automation safe while they are edited.

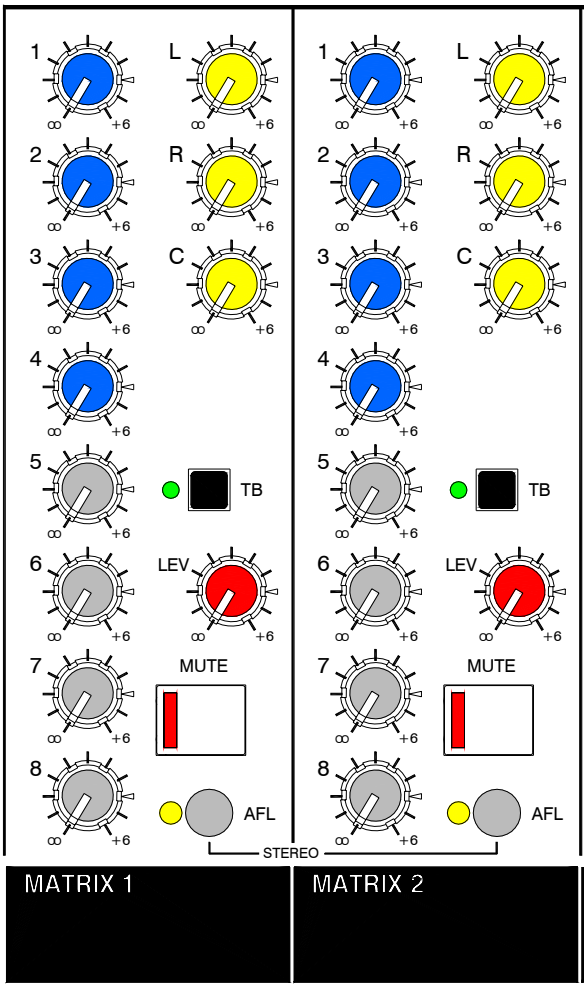
Edit Groups The LED lights to indicate that the master is assigned to the MUTE group.

WEDGE MODE. This underpanel mode switch configures the C output to become the engineers monitor when the console is used for the stage monitor application. When pressed the monitor source is routed in mono through the C insert and fader to the main output. The C mix bypasses this section and is available from the matrix outputs if needed. The yellow LED lights when wedge mode is selected. The switch is protected to prevent accidental operation. Use a pen or pointed implement to select the required mode.

PEAK. The red PK LED senses the signal both pre and post master fader and lights to warn when the main mix is within 5dB of clipping. Reduce the inputs to the mix if the LED flashes.

FADER MASTER. The main mix L,R and C each have a 100mm smooth travel ALPS K-fader providing +10dB gain above the nominal 0dB operating position. These faders are not part of the console VCA group system.

4 Matrix outputs are available. Each has 11 sources derived from group 1-8 and the LRC main mixes. Conveniently positioned away from the other controls, these can be used to create independent mixes for distributed speaker systems, recording, broadcast, video and other special feeds. They include mute switches, talkback assign, balanced XLR outputs and mono/stereo AFL.



GROUP 1-8. Each of the 8 groups can be mixed into the matrix. The source is derived post-fader. Adjust the level clockwise from fully off to +6dB boost. The '0dB' position is marked.

L,R,C. Each channel of the main output can be mixed into the matrix. The source is derived post-fader. Adjust the level clockwise from fully off to a maximum +6dB boost.

TB ENABLE. Press this to enable talkback to the matrix output. When selected, pressing the TALK TO TB switch routes the talkback mic signal, or pressing the OSC/NOISE TO TB switch routes the oscillator/noise generator signal to the output. When not selected, pressing these switches does not affect the output. The talkback and osc/noise signals are routed pre master level.

MASTER LEVEL. Adjusts the matrix output level from fully off to a maximum boost of +6dB. The normal '0' position is marked.

MUTE. This latching switch turns the matrix master signal on or off. It is not part of the console mute group and automation system. The switch illuminates when the signal is muted.

AFL. Press this switch to listen to the matrix signal in the headphones or engineers monitor without affecting the main outputs. The signal is monitored post-level, pre-mute so that it can be checked while the output is muted.

This switch has the same capability as the fader master section AFL. Includes momentary or latching action, add or auto-cancel mode, all clear and PAFL override AFL logic.

Mono or stereo AFL. Press a single AFL switch to listen to that matrix as a mono signal fed to both left and right channels of the headphones and local monitor. Press two related AFL switches together to listen to a related pair in stereo, ideal when checking stereo sends. The odd number master is fed to the left channel, even to right.

Using the Matrix

The matrix provides 4 additional console outputs. It is a 'mixer within a mixer' taking its source from the groups and main mix. It can be used to provide duplicate main outputs or to create new mixes from the main outputs. The possibilities are endless. A few applications are discussed below:

Distributed Speaker Systems. The traditional application for the matrix is to feed a multi-speaker system such as that found in theatre sound reinforcement. Use the console L,R and C outputs to feed the main front speakers typically hung around the proscenium arch. Use the matrix to provide independent mixes to the under-balcony, centre, side and rear fill speakers.

The fill speakers should be delayed to acoustically align the signal with the stage so keeping the listener focussed on the source of the sound. They would also be equalised to aid intelligibility without distracting the listener from the source. You may wish to send only certain groups of sound to the fill speakers. Use the group 1-8 controls to create the required balance, for example just the vocal groups to improve speech intelligibility. You could add in a small amount of the main mix with the LRC controls using equal amounts of L and R to create a mono mix.

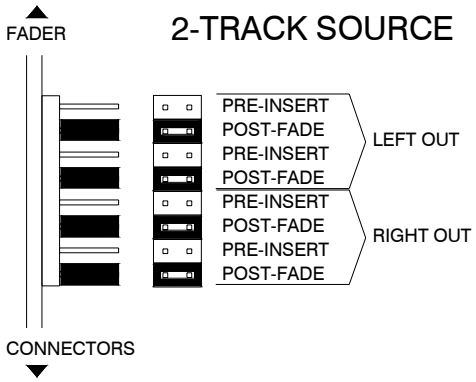
Recording and Broadcast Feeds. Use the matrix to create feeds in mono, stereo or both. It may not be good enough to simply tap off the main console mix, especially in smaller venues where the acoustic output from the band back line or orchestra contributes to the front-of-house sound. Here, the acoustically strong sounds such as drums, bass and guitar may be low in the front-of-house mix. You can compensate for this in the recording using the matrix. Start with the main LRC mix then add the groups to boost selected sounds.

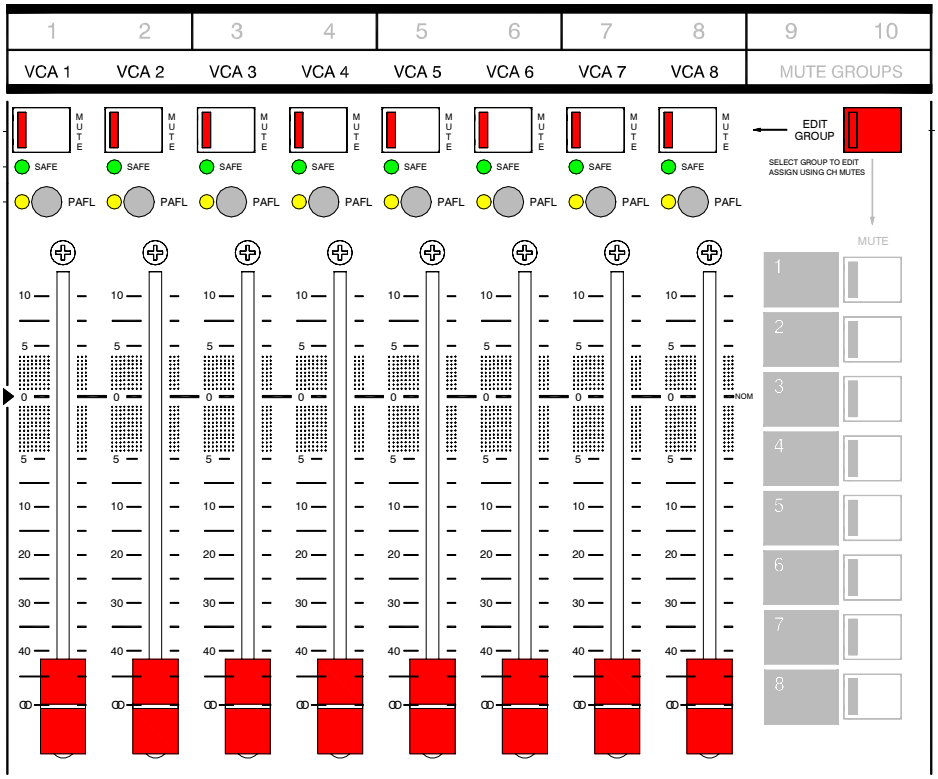
Stereo from LCR. The matrix also lets you create stereo feeds from a 3 output LCR mix by adding C into both channels. Use one matrix with L+C routed, the other with R+C to feed the left and right recording channels.

Managing the Matrix. Check the matrix mix using AFL. Press the related pair together to listen in stereo if you are using two matrix outputs as a stereo feed. Use TB to route talkback or the oscillator/noise generator to the matrix to test speakers and feeds.

2-TRACK Output

The 2-track output is sourced from the main LR mix. The factory default setting is post master LR faders. If you want to source pre-insert, pre-fader then replug the internal jumper links on the LR MIX circuit board as shown below. For stereo recording from a three channel LCR mix, or by creating a new balance from the groups, use the MATRIX outputs instead.





VCA Groups Explained

VCA groups provide an important alternative to audio subgroups for simultaneously controlling the level of more than one channel using a single fader.

Unlike an audio subgroup the signal is not routed through the group fader itself. Instead, you route the signal directly to the main output. The VCA group fader sends a DC voltage to remotely control the assigned channel levels, so providing the group control. This is possible because each channel has a pre-pan VCA (voltage controlled amplifier) which can be controlled by both the channel fader and group faders. This means that all post-fade outputs from assigned channels will be affected by the VCA master faders. Note that the channel pre-fade (monitor) sends are not affected by VCA groups.

Note that the channel fader always controls the signal level. If the channel is assigned to one or more VCA groups then both the channel and the group faders control the level as if they were in series. Refer to the diagrams over the page.

The **ML4000** has 8 VCA groups. Mono and stereo input channels can be assigned to one or more groups. The VCA group assignments are stored as part of the console snapshot memory system (externally controlled).

The benefits of VCA grouping

Effects balance is maintained. Because the channel post-fade sends are affected, the reverb level returned elsewhere in the console also follows the group fader movements.

Stereo groups on one fader. Because the level is controlled before the channel pan circuit, a single VCA group fader is all that is required to control a stereo or LCR group. This would take 2 or 3 faders using audio groups if the channel pan image is to be maintained.

Multiple output control. The relative balance between all outputs is maintained when moving VCA group faders.

Multi-level grouping. A channel can be assigned to more than one VCA group. This lets you assign multi-level groups, or even a ‘grand master’, impossible with audio groups.

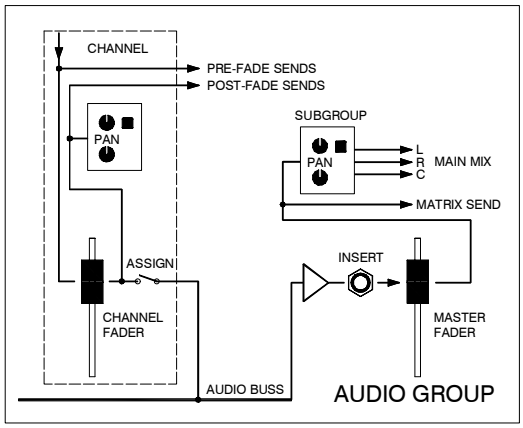
Conventional audio groups are still useful when you need to insert a signal processor such as a compressor to affect a group of signals, or you need to feed different groups of signals into the matrix. However, fewer such groups are usually required on a VCA equipped console. For this reason the **ML4000** provides the mode switching to reconfigure unused audio groups as full featured aux sends.

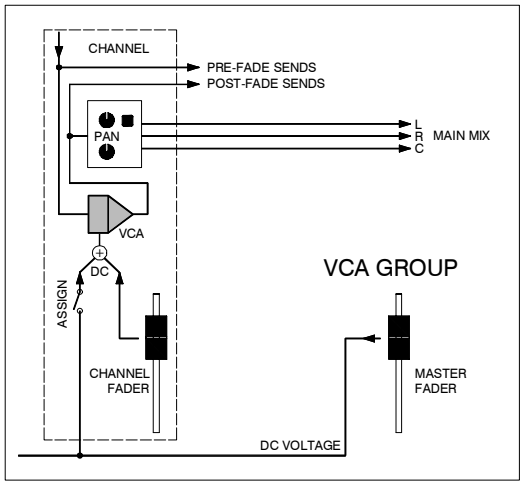
Using VCA Groups

Use audio groups where you want to insert group signal processing or send groups of signals to the matrix. Use VCA groups if you want grouped level control only.

Route the channels to the mix by pressing the MAIN MIX switch. Adjust the PAN and BLEND controls for the image required. Assign the channel to the required VCA group using the edit groups routine described on the next page. Check the channel VCA assign LEDs next to the fader for correct assignment. Once assigned, the group fader affects the channel level. Start with the group fader set to its nominal '0' position.

You can assign the channel to more than one group. Take for example a theatre musical production. Here, you may have stage microphones assigned to Group 1, radio mics to Group 2, and all microphones to Group 3. You may also have all channels assigned to Group 8 as a 'grand master' to control the overall volume. In this case, a radio microphone would be assigned to Groups 2, 3 and 8. Note that the VCA groups affect all channel post-fade sends such as effects and direct outputs but not the pre-fade monitors.





MUTE. This momentary action switch turns all assigned input channels on or off. It acts as a remote control for the mute switches on those channels. The channel pre-fade, post-mute sends are also affected. The mute switches on assigned channels light when the group is muted.

The switch also functions as a group select key when in EDIT GROUPS mode, or as a safe select when in EDIT SAFES mode.

The VCA group mute cannot be assigned to a mute group or snapshot memory. However, channels which have been muted by the group can be stored in the memories.

PAFL. Press this switch to listen to the group signal in the headphones or engineers monitor without affecting the main outputs. It acts as a remote control for the PAFL switches on assigned channels. It actions either all channel PFL or stereo AFL in-place depending on the setting of the master section INPUT PAFL switch.

Using PAFL

Set the master section INPUT PAFL switch for either PFL or stereo AFL in-place when you select a VCA group PAFL.

Use PFL to check for signal presence while the group fader is down. This is useful when you need to check that all is well before raising the fader and bringing the assigned channels into the mix. The channel PFL switches are turned on and the signals mixed together at the same level. Turn down the master PFL TRIM control N1 if the signal is too loud in the monitor.

Use AFL to check the balance and contribution of the group of channels to the mix. The signal follows the fader levels and image controls with C mixed into the L and R so that you can listen to the LCR mix in stereo.

VCA GROUP FADER. The fader adjusts the level of all channels assigned to the group. The '0' position is referred to as the 'nominal' operating setting. At this position the channel levels are as marked on the channel faders. Any adjustment made to the group fader offsets the channel level by that amount. It is best to start with the group faders set to their '0' position.

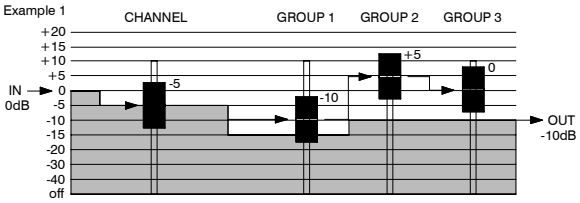
At minimum position the fader shuts off all assigned channels. At maximum position it provides a further +10dB boost. Note that the maximum boost that may be applied to the channel VCA is +10dB regardless of how many group faders are assigned and set above '0'.

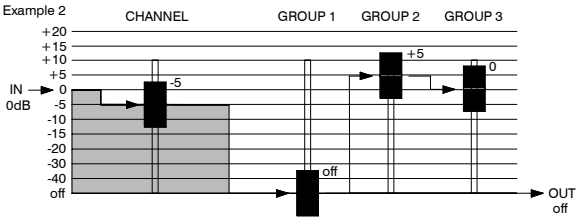
The following diagrams illustrate the combined channel gain when assigning more than one VCA group. In this case the final gain is affected by the channel fader and three VCA groups.

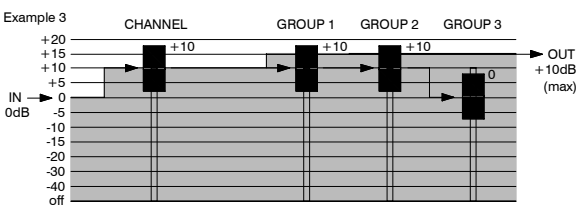
Example 1. A 0dBu signal is passed through the channel. The fader attenuates this by 5dB. Group1 attenuates it by a further 10dB to –15dBu. Group2 boosts by 5dB bringing it up to –10dBu. Group3 is set to '0' resulting in the final level of –10dBu.

Example 2. Once again the channel fader attenuates the signal to –5dBu. However, Group1 is set to minimum turning the signal off. There is no output regardless of the setting of Groups 2 and 3.

Example 3. Here the channel fader and Groups 1 and 2 faders are set for +10dB boost. The result is the channel VCA reaching its maximum of +10dB regardless of the combined 30dB boost. It is best to work with the faders around '0' and avoid excessive boost.







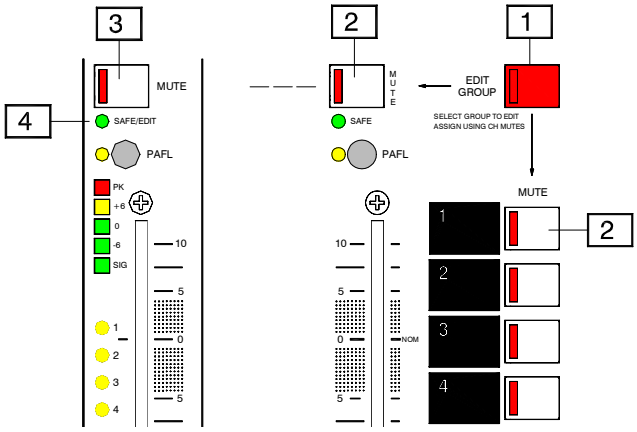
EDIT GROUPS. Press this switch to put the console into edit groups mode. The red LED flashes to warn that the console is in edit mode. Press at any time while the LED is flashing to restore normal operating mode. All the VCA group MUTE LEDs and channel SAFE/EDIT LEDs turn off when edit mode is first entered. This means that no group is selected for editing.

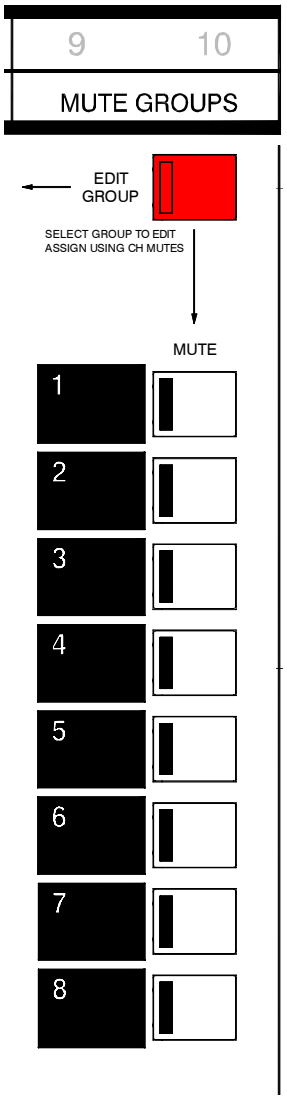
The same edit groups mode is used to edit both the mute and VCA groups. Pressing the associated master switch while in edit mode selects the mute group or VCA group you want to edit.

Only one group may be edited at a time. The current assignments for all groups are always displayed on the channel VCA assign LEDs.

To Assign a VCA Group

Press EDIT GROUPS. Next, press the MUTE switch for the group you want to edit. Both switches flash. The channel SAFE/EDIT LEDs display which channels are currently assigned to the group. Now press the channel MUTE switches to toggle channels in or out of the group. Press EDIT GROUPS again to exit edit mode, or press another group mute switch to edit a different group.





Mute Groups Explained

A mute group lets you turn a selected combination of channels on or off with a single key press. The mute group key acts as a remote control for the assigned channel mutes.

Mute groups are edited by selecting edit groups mode and using the channel MUTE switches to assign channels to the group. The assignment is edited or viewed one group at a time.

The **ML4000** has 8 mute groups. You can select more than one group at the same time. VCA group mutes cannot be assigned to the mute groups. Mute group settings are not stored as part of the console snapshot memory system. However, channels which have been muted by a group and have not been made safe from the automation will be stored.

EDIT GROUPS. Press this switch to put the console into edit groups mode. The red LED flashes to warn that the console is in edit mode. Press at any time while the LED is flashing to restore normal operating mode. All the group MUTE LEDs and channel SAFE/EDIT LEDs turn off when edit mode is first entered. This means that no group is selected for editing.

Only one group may be edited at a time. The current assignments for the selected mute group are displayed on the channel SAFE/EDIT LEDs.

MUTE GROUP. Press one or more of these momentary action switches to mute the channels assigned to them. More than one group can be selected at the same time. The switch illuminates when the group is selected. Press again to turn the group off. Note that you can release and reselect the assigned channel mutes while the group is on.

To Assign a Mute Group

Press EDIT GROUPS. Next, press the MUTE switch for the group you want to edit. Both switches flash. The channel SAFE/EDIT LEDs display which channels are currently assigned to the group. Now press the channel MUTE switches to toggle channels in or out of the group. Press EDIT GROUPS again to exit edit mode, or press another group switch to edit a different group.

Using Mute Groups

Applications include muting groups of instruments, unused channels when mixing different bands, all channels except walk in music before the show starts, all effects, a bank of radio mics during an instrumental number, stage mics during a scene change, and so on.

Snapshots Explained

Note: This function is not available from the console control surface. It is an 'extra' feature accessed via the MIDI or RS232 port using a PC running the Allen & Heath ML4 Archiver program. This can be downloaded from the Allen & Heath Internet site. Full details and instructions are provided with the program.

The mute and VCA assignment settings can be stored in the 128 console 'snapshot' memories. This is similar to taking a 'picture' of the settings. These can be recalled for scene or song changes during live performance. Patch changes can be linked to external sequencers and effects devices using MIDI for sophisticated show control and archiving of the memories.

Channels made safe are not affected by the snapshots. Memory data is retained on power down.

The following capability is provided:

- 128 Snapshot memories
- Channel automation safes
- Store console settings to the snapshots
- Recall to overwrite the console settings
- Auto increment on recall
- Disable store to protect the memories
- MIDI program message send and receive
- MIDI dump in/out for archiving
- MIDI channel number select
- MIDI / RS232 activity indicators

A Note on Snapshot Mutes

The input and output channel mutes can be stored and recalled from the snapshot memories. The VCA group and Mute group mutes cannot. However, those channels muted by the groups, and not made automation safe, at the time the snapshot is stored will be stored and recalled.

Recalling a snapshot does not turn off any mutes which have been turned on by the Mute and VCA groups. The groups always take priority.

Channel Safes Explained

A channel is referred to as being made 'safe' when it is protected from being overwritten or affected by an automated process.

Selected channels can be made safe from the automation so that they are not overwritten by the snapshots and MIDI messages. This is useful when channel allocations are changed 'on the fly' during a pre-programmed show. Input and outputs can be made safe.

EDIT SAFES. Press this switch to enter edit safes mode. The red LED flashes to warn that you are in edit mode.

Making a Channel Automation Safe

From normal console mode press EDIT SAFES. The red LED flashes. Now press the mute switches on the channels you want to make safe or restore to automation. The channel SAFE/EDIT LED lights if the channel is safe. Press EDIT SAFES again to return to normal console mode.

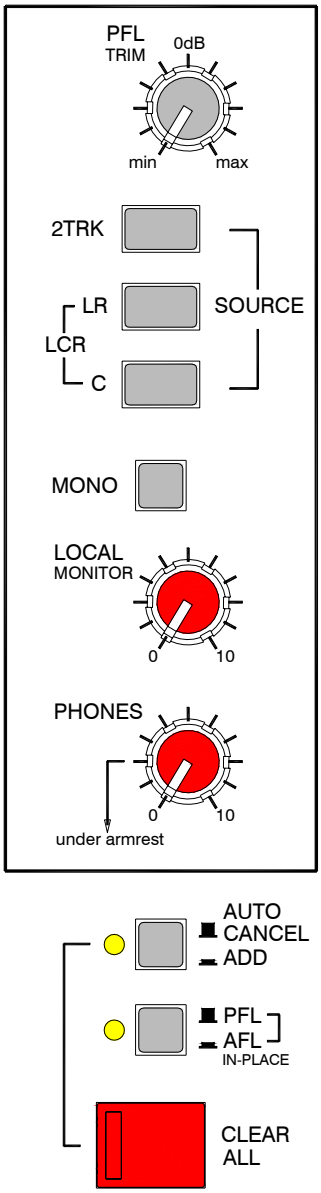
Using Snapshot Memories

The snapshot memories provide a powerful automation tool. Decide first if and how you wish to use the system:

Automated Mutes and VCA assignments. This adds a powerful new level of automation. Attaching the VCA group assignments to the snapshot system means that which channels are assigned to the VCA groups can change scene by scene or song by song. For example, a VCA fader may be assigned as 'lead vocal', another as 'chorus'. A performer may sing lead in one song and chorus in the next while a different singer (channel) takes the lead. The same group faders adjust the lead and chorus levels. This may also apply when mixing different bands on the same faders, or applying different effects to different songs.

For more automated control you can connect a MIDI sequencer or show controller to sequence and trigger the memories according to programmed cues.

Refer also to the section on MIDI /RS232 for details on archiving the console settings and memory contents.



The Console Monitor System

The engineer is able to listen to any channel, mix or matrix signal using stereo headphones and an amplifier/speaker system connected to the local monitor output. In addition the C output provides an engineers wedge monitor feed when the console is configured for monitor operation. All have independent level control. The headphones are connected by plugging in under the front armrest.

The source is selected as either the 2-track input, main LR mix, main C mix, or LR combined with C for listening to a 3 output LCR system using the stereo monitor. Pressing any console PAFL or AFL switch overrides this selection with a priority well suited to live sound applications. The selected source can be listened to in mono or stereo. All monitor outputs automatically dim by 20dB when the TALK switch is pressed.

The **ML4000** features an intelligent P/AFL system that provides extended monitoring capability. The inputs can be selected as mono PFL or stereo in-place AFL, the outputs as mono or stereo AFL. Selection is auto cancel or add mode. How the switches are pressed determines if they have a latching or momentary function.

Together with the wedge monitor capability this gives the engineer total and conveniently quick monitoring of all sounds passing through the console.

The Monitor Logic

- No switches pressed = quiet
- Main selection: 2-TRK overrides LR, C
- LR and C together = LCR in stereo
- Pressing AFL overrides the main selection
- Pressing PAFL overrides AFL and main
- Releasing PAFL restores AFL
- Pressing AFL cancels PAFL
- CLEAR ALL cancels all PAFL and AFL
- Input PAFL = mono PFL or stereo in-place AFL
- Output AFL = mono or stereo AFL
- Press related two together = stereo AFL
- Hold P/AFL longer than 1 second = momentary
- P/AFL selection is cleared on power down
- The L,R,C meters = main mix or P/AFL
- Pressing TALK dims all by 20dB

PFL TRIM. Adjust this control to set the listening level of the PFL selection. Provides a range from -12dB attenuation to +6dB gain with normal '0dB' centre detented position. It does not affect the PFL metering which always reflects the true reading.

This lets you match the PFL listening level to your normal AFL and main mix monitoring levels, typically much quieter. It can prevent the sudden rise in volume when you press a PFL switch.

2TRK SOURCE. Press this switch to listen to the 2-track input in the headphones, local, and engineers wedge monitors. The signal is fed in mono to the engineers wedge. This lets you check the output of a stereo recorder. This selection overrides any selected LR and C monitor source until released. It is itself overridden by any P/AFL selection. The 2TRK source is not sent to the meters.

LR SOURCE. Press this switch to listen to the main post-fade LR output in stereo. It is overridden by the 2TRK and P/AFL selections.

C SOURCE. Press this switch to listen to the main C (centre) output in mono. As with LR it is overridden by the 2TRK and P/AFL selections.

Press LR and C together to monitor a 3 output LCR system in stereo. This mixes the C signal equally into L and R.

MONO. Press this switch to listen to the selected monitor source in mono. This only affects the monitor outputs.

It is useful to check for mono signal compatibility. If the signal drops in level or loses quality when monoed then there may be a problem with phasing between the left and right signals.

LOCAL MONITOR LEVEL. This adjusts the stereo local monitor output level.

PHONES LEVEL. This adjusts the level of the monitor signal in the stereo headphones.

WARNING: **To prevent damage to your hearing start with the headphones level set to minimum. Avoid continued high listening levels in the headphones or any other earpiece.**

ADD MODE. This switch determines how the P/AFL system works. It selects whether pressing one or more input PAFL switches cancels or adds to the previous selection, the same for the output AFL switches. It does not affect the how the PAFL and AFL switches interact.

Auto-cancel. In its up position auto-cancel mode is selected. Pressing a PAFL automatically turns off any previous PAFL selection, and pressing an AFL turns off any previously AFL selection. This lets you quickly check the channels one at a time without having to turn each selection off first.

Add mode. Press this switch to select add mode. Pressing a PAFL adds to any currently active PAFL selection, and pressing an AFL adds to any currently active AFL selection. This lets you check combinations of signals in the monitor.

PAFL / AFL interaction. Pressing any PAFL while AFL is active automatically overrides the AFL selection by turning it off. Releasing PAFL restores the AFL selection. However, pressing any AFL while PAFL is active cancels the PAFL selection. Releasing AFL does not restore the PAFL selection. This logic suits live sound mixing where you would monitor an output mix using AFL and interrupt it to quickly check the input sources using PAFL.

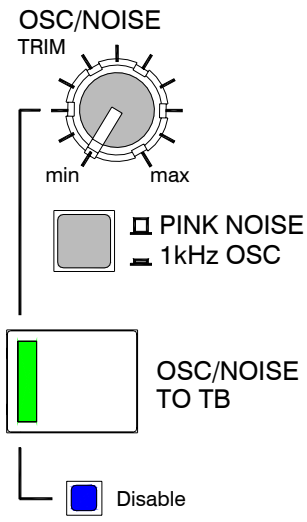
INPUT PAFL. In its up position pressing an input channel PAFL switch selects PFL. In its down position stereo in-place AFL is selected. It does not affect the output AFL switching.

Input PFL (pre-fade listen). The input channel pre-fade signal is monitored in mono.

Input AFL (after-fade listen). The input channel post-fade, post-pan/blend signal is monitored in stereo. It follows the setting of the pan and blend controls with C mixed into L and R. This lets you check the level and image of the signal in the mix.

Output AFL. The output channel post-fade signal is monitored in mono or in stereo pairs.

CLEAR ALL. Press this switch to turn off all currently selected PAFL and AFL switches. Its LED lights to show that one or more switches are active and can be cleared.



OSC/NOISE TRIM. Adjusts the level of the oscillator or noise signal from –30 to +10dB.

OSC/NOISE SELECT. In its up position pink noise is selected as the generator source. Press to select the 1kHz test tone.

Pink noise. This is a constant level random noise signal with equal energy per octave covering the full audio bandwidth.

1kHz Oscillator. This produces a pure 1kHz tone (sine wave) for single frequency testing and line up.

OSC/NOISE TO TB. Press this switch to route the pink noise or 1kHz tone test signal to any combination of LR, C, Matrix and Grp/Aux outputs that have their TB switches selected. The switch has a latching action so that it can remain selected while testing and calibrating the speakers.

DISABLE. Press the underpanel switch to disable the osc/noise generator. This protects against accidental operation during live performance.

WARNING: The generator is capable of producing a high level continuous signal. To avoid damage to the speakers check that the generator and output levels are turned down before you route the test signal to the outputs.

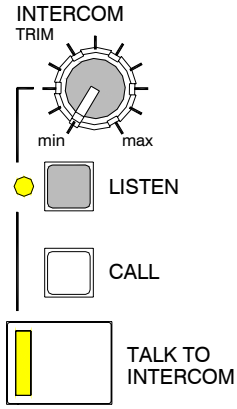
Using the Osc/Noise Generator

Start with the TRIM control turned down. Select either pink noise or the 1kHz tone as the test signal. Check all the TB enable switches are correctly set to route the signal to the required outputs. Make sure the DISABLE switch is up (flush with the panel). Press OSC/NOISE TO TB to route the signal to the selected outputs. Raise the TRIM control and output faders to achieve the level required. The test signal should register on the console meters in the normal way.

Use pink noise to test the speakers for correct operation. This is made up of the full audio bandwidth and can test all the drivers at the same time. Used with a reference microphone and RTA (real time analyser) you can check the venue acoustics for frequency response.

Use the 1kHz tone to check matching and line up between equipment by adjusting input and output levels using the meters as the reference.

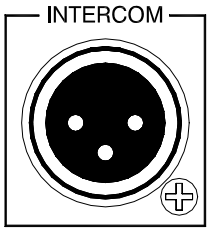
When you have finished using the generator be sure to disable it if you want to avoid the possibility of accidental operation during performance.



INTERCOM TRIM. Adjusts the level of the intercom signal in the console headphones. This is not affected by the PHONES level. The console monitor and intercom listen signals are independently controlled.

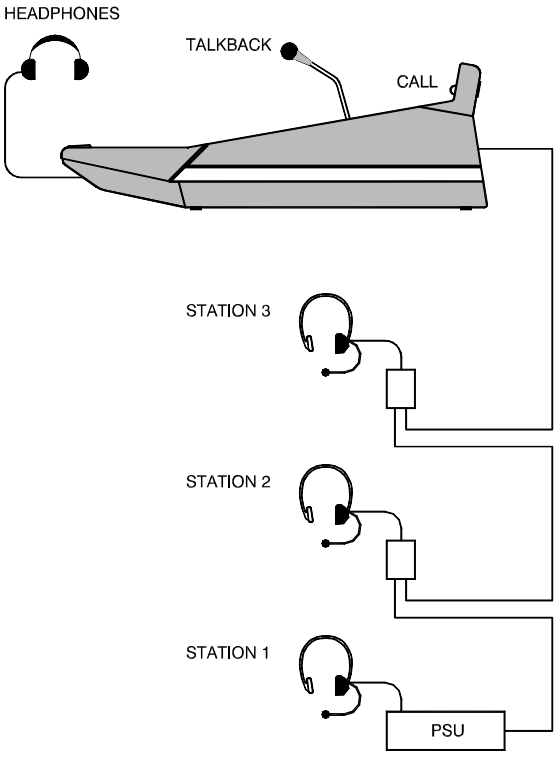
LISTEN. Press this switch to route the intercom signal to the console headphones. You can choose when you want to listen in to the intercom. This prevents background noise when you are trying to monitor the console signals.

CALL. Press this momentary action switch to signal the intercom. This lights the call lamps on all connected intercom stations as well as the CALL lamp in the meterpod.



TALK TO INTERCOM. Press this momentary switch to talk to all connected intercom stations. It does not affect any of the console outputs.

CONNECTOR. Rear panel 3-pin XLR female socket. Connect to the intercom ring using a 2 core shielded audio cable such as a microphone cable.

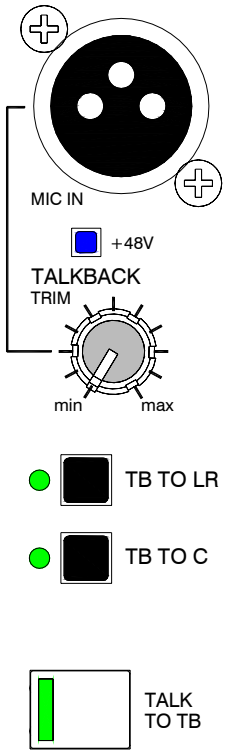


The Intercom Explained

A Clearcom compatible interface is built into the console. This industry standard intercom system provides two way talk and signal communication so that technicians and stage crew can communicate during set up and performance. It uses a three wire connection such as a microphone cable. The intercom interfaces with the talkback mic and console headphones system. This avoids the difficulty faced by operators in checking problem sources such as radio mics in the console headphones while communicating with stage crew via a separate intercom headset.

It is useful to be able to turn off the intercom audio while checking console signals and to reduce unwanted background audio while running the show. A large yellow lamp in the meterpod lights to attract the attention of the operator when the intercom is being signalled, especially useful if LISTEN is turned off.

The controls are logically grouped near the talkback section for easy single handed operation of the listen, signal and talk functions.



MIC INPUT. Top panel 3-pin XLR female socket for plugging in gooseneck microphone for the console talkback system. The input is balanced.

+48V. Press this underpanel switch to assign +48V to the XLR for microphones that require phantom power.

To avoid loud clicks do not press the TALK TO TB switch while you are switching phantom power on or off, or plugging or unplugging the microphone.

TALKBACK TRIM. Adjusts the sensitivity of the input to match the connected talkback microphone. The range is +5dB to +50dB gain.

TB TO LR. Press this to enable talkback to the main LR output. When selected, pressing the TALK TO TB switch routes the talkback mic signal, or pressing the OSC/NOISE TO TB switch routes the oscillator/noise generator signal to the output. When not selected, pressing these switches does not affect the output. The talkback and osc/noise signals are routed into the mix pre master level.

TB TO C. This is similar to the switch described above but enables talkback to the main C output.

TALK TO TB. Press this momentary switch to talk to all output destinations which have their TB switches selected. The green switch LED lights when one or more TB switches are selected to warn that the signal will be routed to an output when TALK is pressed. If no TB switches are selected the LED remains off.

The microphone is turned on when the switch is pressed and turned off as soon as it is released. Pressing TALK automatically dims the console headphones, local monitor and engineers wedge monitor by 20dB.

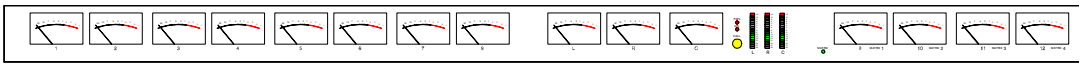
Using Talkback

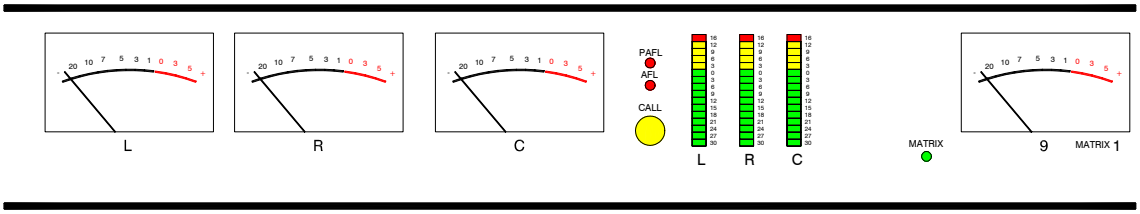
Talkback lets the operator talk to one or more console outputs, for example to communicate with performers on stage through their monitor speakers, cue a recording via the matrix, or make a public announcement through the main mix.

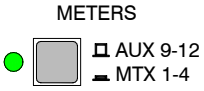
Plug in the talkback microphone. Select +48V if it needs phantom power. Start with the TRIM control turned down. Enable talkback to the required output by selecting its TB switch. The TALK switch green LED turns on. Check that the output faders and levels are set to their normal operating position.

Now press the large TALK TO TB switch and talk into the microphone. Adjust the TRIM control for the required volume. The console monitor level is automatically dimmed to avoid acoustic feedback and aid intelligibility. To avoid accidentally routing talkback where it is not wanted you should release the TB enable switches when finished.

If you do not need to use talkback you can release all the TB enable switches and use TALK TO TB as a monitor dim function, for example when using the intercom, when talking with someone at the console, or to dim the pink noise signal when testing speakers.

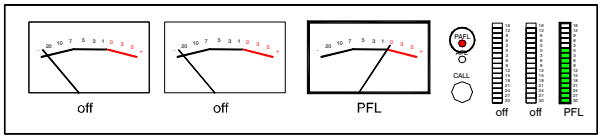






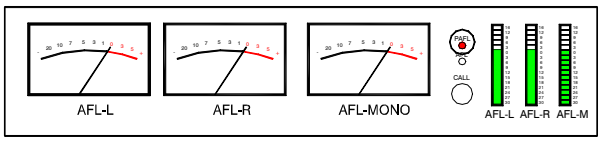
INPUT PAFL = mono PFL

Mono PFL on C meter. L and R meters turn off.



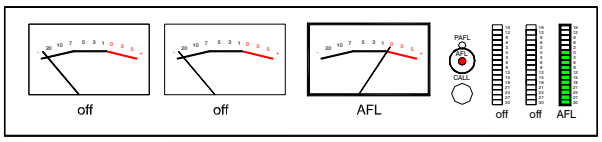
INPUT PAFL = stereo AFL

Stereo on L,R meters, mono sum on C meter



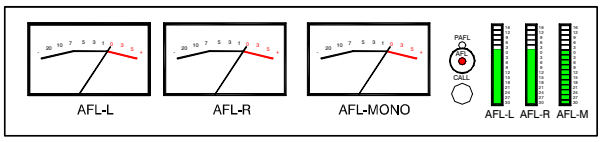
OUTPUT AFL = mono

Mono AFL on C meter. L and R meters turn off.



OUTPUT AFL = stereo

Stereo on L,R meters, mono sum on C meter



The Console Meterpod

The **ML4000** continues the Allen & Heath tradition to provide full signal metering at all key stages in the signal chain. The channel LED meters give you important signal information and multipoint peak sensing. The output LED meters display the pre-fade mix levels. The meterpod displays all the post-fade main output levels including groups, auxes, matrix and main, as well the PFL/AFL metering of any signal in the console.

The meterpod is a low profile, full length integral design that cannot be removed. It has 15 illuminated moving coil VU meters. The right hand VU meters can be switched to display either Aux 9-12 or Matrix 1-4 outputs. For example you could configure the console to display Groups 1-8, LCR, and Matrix 1-4 on the meters in front-of-house mode, or Aux 1-12 in stage monitor mode.

The 3 main output meters are duplicated on both VU and LED bar meters so that the main or PFL/AFL signals can be checked for average and peak levels simultaneously. Bright red LEDs light when an input PAFL or output AFL has been selected. The meters switch to display the PFL or AFL signals in mono or stereo+mono. Stereo AFL displays the left and right signals as well as the summed mono signal so that mono compatibility can be checked.

A large CALL lamp is positioned centrally to grab the attention of the operator when the intercom is being signalled.

The console lamp connectors are positioned on the rear of the meterpod. Standard 4-pin right-angled XLR gooseneck Littlites are recommended.

GRP/AUX VU Meters 1-8. Illuminated moving coil VU (volume unit) meters display the output levels of mix 1 to 8. Depending on the setting of the master section mode switches these display group or aux signals. The signal is metered post-fade, post-mute.

MAIN LRC VU Meters. Illuminated VU meters display the output levels of the main mix. The signal is metered post-fade, post-mute. The meters automatically switch to display PFL or AFL levels when a PAFL or AFL switch is selected.

MAIN LRC Led Meters. These 16 LED bar meters duplicate the readings of the main VU meters. They also switch to display PFL or AFL when selected. Sensitivity ranges from –30dB to +16dB. A 0dB meter reading represents 0dBu at the main XLR outputs.

Three LED colours display signal condition:

Green. Normal signal readings up to 0dB.

Yellow. Hot signal readings above 0dB and up to 12dB. Loud moments reading up to 6dB are fine. Higher readings warn of reduced headroom.

Red. Lights at +16dB to warn that you are within 5dB of clipping and audible distortion. If this flashes then reduce the gain or mix levels.

PAFL and AFL Indicators. These light when an input PAFL or output AFL switch is selected. They show that the main meters and console monitor are switched to the P/AFL rather than main mix signals.

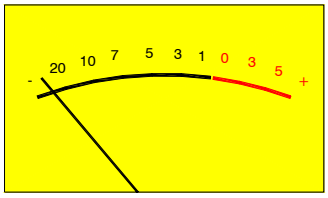
CALL Lamp. Lights when the intercom is being signalled. Its large size and position in the meterpod ensure it grabs the attention of the operator when signalled.

MATRIX Meter Select. Press the METERS switch in the master section to switch the right hand VU meters to display the Matrix 1-4 rather than Aux 9-12 output levels. The green LED in the meterpod lights when matrix is selected.

AUX/MATRIX VU Meters. Illuminated moving coil VU (volume unit) meters display the output levels of Aux 9-12 or Matrix 1-4 if selected. The signal is metered post-fade/level, post-mute.

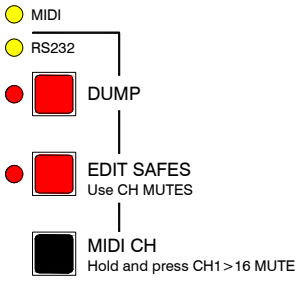
Meter Types

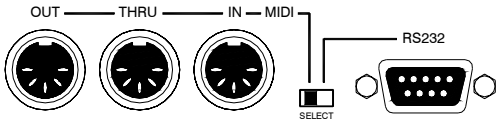
Both VU and LED bar types of meter are provided on the **ML4000**. This gives you the best of both average and peak metering.



VU Meter. The VU (volume unit) meter is an established standard for measuring audio signals. Unlike LED meters, it is easy to read under all lighting conditions. This makes it well suited to outdoor festival work. It has reasonably slow dynamics (attack and release) and is therefore good at displaying the average music programme. It is not able to display fast peaks and transients. The scale is restricted between –20 and +5 to provide good resolution around average reading. A reading of '0' represents 0dBu at the main outputs.

LED Bar Meter. This meter comprises a ladder of LEDs each set to light when the signal reaches its preset level. It has the advantage of much faster dynamics and can show the musical peaks and transients. The scale is extended to read from a low –30 to a very high +16 which represents a peak warning 5dB before clipping.





The MIDI Cables

Use standard 5-pin 180 degree DIN type male-to-male MIDI cables. These should be available from your local audio dealer or music shop. The cables should not exceed 15 meters (50 feet) in length.

To control external equipment plug console MIDI OUT to external equipment MIDI IN. To control the console plug external equipment MIDI OUT or THRU to console MIDI in. To pass MIDI through the console to other equipment plug console MIDI THRU to equipment MIDI IN.

Make sure the same MIDI channel number is selected on the console and external equipment you want the console to communicate with.

MIDI Overview

The **ML4000** includes a Musical Instrument Digital Interface (MIDI) port. Standard 5-pin IN, THRU and OUT sockets allow connection to external MIDI equipment such as computer show control systems, sequencers, instruments and data archiving devices. Applications include sophisticated 'hands-off' scene control, effects and instrument patch control, switching of signal processing remote controllers, and archiving of the console settings and memories for later re-use.

What the console MIDI can do :

- ✓ Turn channel mutes on and off
- ✓ Recall snapshot memories
- ✓ Snapshot program change messages
- ✓ AFL SysEx messages for BSS & dbx controllers
- ✓ Archive console settings and memories

What the console MIDI cannot do :

- × Turn Mute Groups on and off
- × Turn VCA group mutes on and off
- × Assign channels to VCA groups
- × Control VCA fader levels

The capabilities of the console automation system are subject to continual development and new features may be added in time. The latest operating software is available on the Allen & Heath Internet site together with loading instructions.

Selecting MIDI Operation

For MIDI operation make sure the rear panel switch is set to the MIDI position. The RS232 setting is only used when updating the console operating software to a new version, or with the Allen & Heath ML4 Archiver utility for the PC.

Changing the MIDI Channel Number

Hold down the master section MIDI CH key. The current MIDI channel number is displayed on one of the CH1 to 16 SAFE/EDIT LEDs. The LED flashes to attract your attention. Simply press one of the CH1 to 16 MUTE keys while holding down MIDI CH to change the MIDI channel number. The channel mute is not affected during this operation.

	Standard	'B' versions	
HEX (cc)	MUTE	32ch	40 & 48ch
00	GRP/AUX 1	GRP/AUX 1	GRP/AUX 1
01	GRP/AUX 2	GRP/AUX 2	GRP/AUX 2
02	GRP/AUX 3	GRP/AUX 3	GRP/AUX 3
03	GRP/AUX 4	GRP/AUX 4	GRP/AUX 4
04	GRP/AUX 5	GRP/AUX 5	GRP/AUX 5
05	GRP/AUX 6	GRP/AUX 6	GRP/AUX 6
06	GRP/AUX 7	GRP/AUX 7	GRP/AUX 7
07	GRP/AUX 8	GRP/AUX 8	GRP/AUX 8
08	AUX 9	AUX 9	AUX 9
09	AUX 10	AUX 10	AUX 10
0A	AUX 11	AUX 11	AUX 11
0B	AUX 12	AUX 12	AUX 12
0C			
0D			
0E			
0F			
10	MATRIX 1	MATRIX 1	MATRIX 1
11	MATRIX 2	MATRIX 2	MATRIX 2
12	MATRIX 3	MATRIX 3	MATRIX 3
13	MATRIX 4	MATRIX 4	MATRIX 4
14			
15			
16			
17			
20	CH 1	CH 1	CH 1
21	CH 2	CH 2	CH 2
22	CH 3	CH 3	CH 3
23	CH 4	CH 4	CH 4
24	CH 5	CH 5	CH 5
25	CH 6	CH 6	CH 6
26	CH 7	CH 7	CH 7
27	CH 8	CH 8	CH 8
28	CH 9	CH 9	CH 9
29	CH 10	CH 10	CH 10
2A	CH 11	CH 11	CH 11
2B	CH 12	CH 12	CH 12
2C	CH 13	CH 13	CH 13
2D	CH 14	CH 14	CH 14
2E	CH 15	CH 15	CH 15
2F	CH 16	CH 16	CH 16
30	CH 17	STEREO 3	CH 17
31	CH 18	STEREO 4	CH 18
32	CH 19	STEREO 5	CH 19
33	CH 20	STEREO 6	CH 20
34	CH 21	CH 17	CH 21
35	CH 22	CH 18	CH 22
36	CH 23	CH 19	CH 23
37	CH 24	CH 20	CH 24
38	CH 25	CH 21	STEREO 3
39	CH 26	CH 22	STEREO 4
3A	CH 27	CH 23	STEREO 5
3B	CH 28	CH 24	STEREO 6
3C	CH 29	CH 25	CH 25
3D	CH 30	CH 26	CH 26
3E	CH 31	CH 27	CH 27
3F	CH 32	CH 28	CH 28
40	CH 33	CH 29	CH 29
41	CH 34	CH 30	CH 30
42	CH 35	CH 31	CH 31
43	CH 36	CH 32	CH 32
44	CH 37	CH 33	CH 33
45	CH 38	CH 34	CH 34
46	CH 39	CH 35	CH 35
47	CH 40	CH 36	CH 36
48	CH 41	CH 37	CH 37
49	CH 42	CH 38	CH 38
4A	CH 43	CH 39	CH 39
4B	CH 44	CH 40	CH 40
4C	CH 45	CH 41	CH 41
4D	CH 46	CH 42	CH 42
4E	CH 47	CH 43	CH 43
4F	CH 48	CH 44	CH 44
50	STEREO 1	STEREO 1	STEREO 1
51	STEREO 2	STEREO 2	STEREO 2
52			
53			
54	MAIN L	MAIN L	MAIN L
55	MAIN R	MAIN R	MAIN R
56	MAIN C	MAIN C	MAIN C

Channel Mutes

Pressing any input or output channel MUTE switch transmits a MIDI Note On message. Similarly, receiving a MIDI Note On message will turn the associated channel mute on or off, unless the channel has been made automation safe.

Console mutes are mapped to MIDI Note numbers as shown in the table. Running status is supported on receive and transmit.

Transmit. Pressing a channel MUTE switch transmits the following Note On messages:

9n cc vv 9n cc 00

Where n = console MIDI channel number
cc = input or output channel number
vv = 3FH for mute off, 7FH for mute on

Receive. The console responds to the following MIDI Note On message:

9n cc vv (00 is ignored)

Where vv < 40 = mute off,
40 <= vv <= 7F = mute on

Snapshot Memories

Recalling a snapshot will transmit a MIDI Program Change message. Receiving a Program Change message will recall a snapshot.

Snapshot numbers 1 to 128 are mapped to MIDI Program Change numbers 0 to 127. Running status is supported on receive and transmit.

Transmit and Receive. The message format is:

Cn pp

Where n = console MIDI channel number
pp = console snapshot number 00 to 7F

MIDI AFL Messages

SysEx message strings are transmitted each time an output channel AFL switch is selected or released. These are for use with **BSS** and **dbx** speaker management systems to automatically select the remote control surface associated with the output being AFL monitored.

BSS Omnidrive

F0 00 20 18 7F 20 cc F7

dbx Drive Rack

F0 00 01 1E 7F 7F 20 cc F7

These messages are subject to further development and addition. Please check the Allen & Heath Web site for the latest information.

Archiving the Console Settings

The console settings can be saved to an external device such as a MIDI sequencer or data archiver using the dump out facility. Saved settings can be loaded back into the console using dump in. This is ideal when you want to archive the settings to use at a later date, for example a re-run of a previous performance. You can also use the dump facility to program additional **ML4000** consoles, for example when setting up duplicate shows or swapping consoles around. Simply link MIDI OUT from one to MIDI IN of the other and action the dump out facility.

Settings which are archived :

- ✓ Current mute settings
- ✓ Current Mute group assignments
- ✓ Current VCA group assignments
- ✓ Automation safes
- ✓ All snapshot memories

Settings which are not archived :

- × Current console operating mode
- × Current PAFL selection and settings

MIDI Dump Out

Connect the console to a suitable MIDI archiving device. Set the same MIDI channel number on both. Check the rear switch is set to MIDI. Press the DUMP key. The console dumps the current settings and memory contents using a SysEx message string. During this time the DUMP and MIDI LEDs light to show that data is being sent via the MIDI port. Note that this operation can take up to 10 seconds during which time the console mutes, assignment and P/AFL operations are interrupted.

MIDI Dump In

Connect the console to the MIDI archiving device. Set the same MIDI channel number on both. Check the rear switch is set to MIDI. Start the process using the MIDI archiver. The console current settings and memory contents are overwritten. During this time the DUMP and MIDI LEDs light to show that data is being received by the console. Note that this operation can take a while during which time the console mute, assignment and PAFL operations are interrupted.

If you are using a MIDI sequencer to record the dump out data string then make sure you play it back at the same speed you recorded it. If you dump it back into the console faster than it was recorded some data may not load correctly.

MIDI Dump Message Format

The format for dump out and in is identical. The dump data string is made up of multiple System Exclusive messages (known as packets) which contain the console information.

Transmit and Receive. The format for a single packet is as follows:

F0 <SysEx header> <packet type> <packet number> <data> <checksum> F7

<SysEx header> = 00 00 1A 50 07 VV vv nn

Where VV = software version number – unit
vv = software version number – decimal
nn = console MIDI channel number

<packet no.> = packet number from 0 to 127

<data> = block of console data (7-bit format)

<checksum> = checksum to allow error detection

MIDI Dump Errors

If the console or connected equipment fails to respond to a MIDI dump then check:

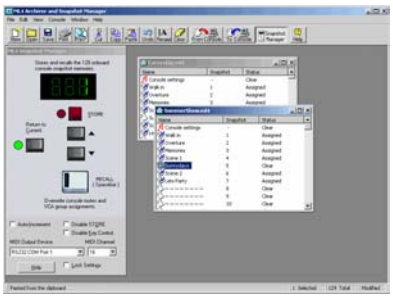
- The MIDI cable is good and correctly plugged
- The same MIDI channel number is selected
- The rear panel switch is set to MIDI
- Try again

Allen & Heath ML4 Archiver

The ML4Archiver Windows™ utility for the PC can be downloaded from the Allen & Heath Internet site. This can be used to archive data to and from the PC via MIDI or RS232.

The program also includes the useful Snapshot Manager which lets you store and recall the console mute settings and VCA group assignments from the 128 internal snapshot memories. The snapshots cannot be accessed from the console control panel itself. The archiver provides this extra feature.

Check the Allen & Heath Web site for further details and loading instructions.



Operating System Technical Support

Operating Software Version Number

You can check the current version number of the **ML4000** software running on the console using a PC connected via RS232. Instructions for this are provided on the Allen & Heath Internet site.

Loading New Operating Software

Check the Allen & Heath Web site for the latest version of console software. New software is loaded from a PC via the RS232 port.

IMPORTANT ! The current console settings and snapshots may be lost when you load new operating software. If you wish to keep your settings and snapshot contents, first archive them using the dump out facility. Restore these after loading the new software by using dump in.

Download the software from the Allen & Heath Web site to your PC computer. Connect the PC RS232 port to the console RS232 port using a standard pin-to-pin (not null modem) 9-pin serial cable. Set the console rear panel switch to the RS232 position. Power up the console. The console awaits data from the PC. Follow the instructions provided on the Web site for loading the new software into the console. When completed make sure you set the console rear panel switch back to its normal operating position, typically MIDI.

Power Up and Power Down

The console settings are saved when power is removed. On power up these settings are restored.

To Reset the Console Settings

Hold down the MIDI CH and EDIT SAFES keys together while turning on the console to reset all current settings. This does not affect the contents of the snapshot memories. The default settings are restored:

- Selects normal console operating mode
- Clears all current Mute Group assignments
- Clears all current VCA Group assignments
- Clears all channel automation safes

To Reset the Snapshot Memories

Hold down the MIDI CH and DUMP keys together while turning the console on to clear all the snapshot memories. This does not affect the current console settings. For all snapshots reset:

- Clears all stored mutes
- Clears all stored VCA Group assignments

To reset all Settings and Memories

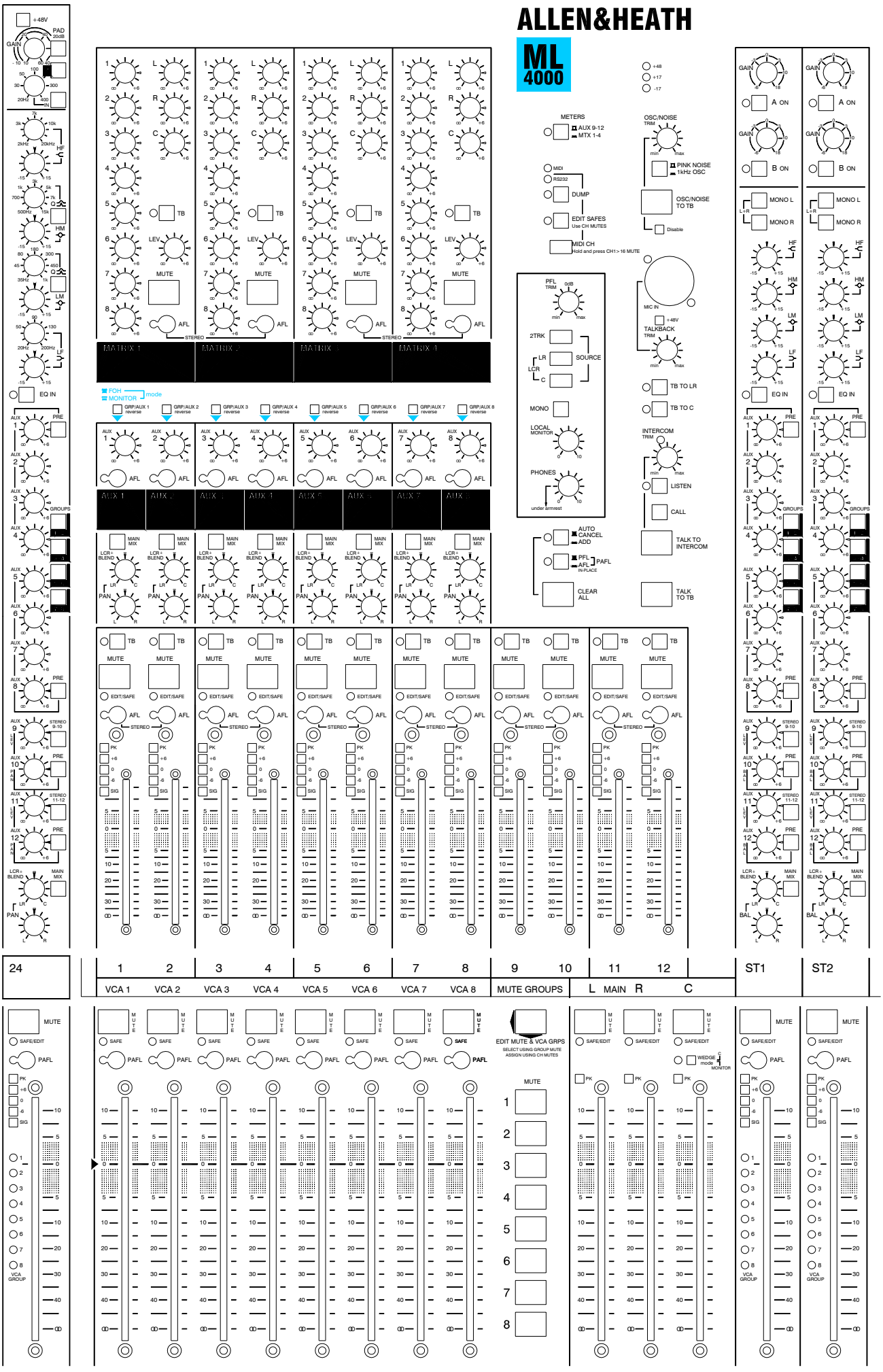
Hold down the MIDI CH, the EDIT SAFES and DUMP keys together while turning the console on to clear all current settings and the memories.

Contacting Allen & Heath

If you have any queries about the automation system please quote the console model, serial number and operating system version number in any communication with Allen & Heath or your appointed service agent. Technical support is available through your dealer or by visiting the Allen & Heath Internet Web site.

www.allen-heath.com

USER NOTES :


ALLEN&HEATH
ML 4000
METERS
AUX 9-12
MTX 1-4
OSC/NOISE TRIM
PINK NOISE
1kHz OSC
OSC/NOISE TO TB
Disable
MIDI
RS232
DUMP
EDIT SAFES
Use CH MUTES
MIDI CH
Hold and press CH1> 16 MUTE
PFL TRIM
2TRK
SOURCE
MONO
LOCAL MONITOR
PHONES
under ermrest
MIC IN
+48V
TALKBACK TRIM
TB TO LR
TB TO C
INTERCOM TRIM
LISTEN
CALL
TALK TO INTERCOM
TALK TO TB
AUTO CANCEL ADD
PFL AFL IN-PLACE
CLEAR ALL
FOH MONITOR mode
MATRIX 1
MATRIX 2
MATRIX 3
MATRIX 4
AUX 1
AUX 2
AUX 3
AUX 4
AUX 5
AUX 6
AUX 7
AUX 8
VCA 1
VCA 2
VCA 3
VCA 4
VCA 5
VCA 6
VCA 7
VCA 8
MUTE GROUPS
L MAIN R
C
ST1
ST2
EDIT MUTE & VCA GRPS
SELECT USING GROUP MUTE
ASSIGN USING CH MUTES

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http://www.allen-heath.com

http://www.mlseries.com